(1)

A STUDY TO DETERMINE

THE RELIABILITY OF ABSTRACTED AND CODED MEDICAL RECORDS DATA WHICH DETERMINES DRG ASSIGNMENT AND ITS POTENTIAL EFFECT ON RESOURCE ALLOCATION AT REYNOLDS ARMY COMMUNITY HOSPITAL (RACH)

A Graduate Management Project

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by

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A descriptive study based on FY 87 data was conducted to determine the reliability of RACH's Medical records abstracted and coded data which determines DRG assignment and its effect on resouc ce allocation.

The research methodology included: a comprehensive literature review the reabstracting and recoding of 372 medical records by an independent Accredited Records Technician, an analysis of the reasons for discrepencies between the RACH original data set and the data set generated by the independent ART, a determination of coding discrepency and DRG reassignment rates, determination of the impact of DRG reassignment on supply resouce allocation and CHAMPUS re-imbursement.

Recommendations based on the study results, the literature review , and DoD medical records specific needs are made. The recommendations are in keeping with acceptable medical records adaptations which were necessary during the civilain implementation of DRGs.

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HSUA-HQ (HSUA-HQ/27 Jun 89) 1st End MAJ Lowery/gm/351-2915
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Major William C. Lowery, MS, Acting Deputy Commander for Administration, Reynolds Army Community Hospital, Fort Sill, OK 73503-6300 28 June 1989

FOR Chairman, Residency Committee, U.S. Army-Baylor University Graduate Program in Health Care Administration, ATTN: HSHA-IHC (P. J. Hall), Academy of Health Sciences, U. S. Army, Fort Sam Houston, TX 78234-6100

1. Forwarded for your final approval is the Graduate Management Project (GMP) for Major Byrdia L. Turner, AN, as partial fulfillment of the requirements for her Masters degree.

2. Major Turner has made modifications to the GMP in accordance with instructions received from committee members. COL Bradford supports the study conclusions, and that portion of the GMP was not changed.

William C. Lowery

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MAJ, MS
Acting Deputy Commander for
Administration/Preceptor

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INTRODUCTION

One result of efforts to contain escalating health care costs has been prospective payment reimbursement programs based on Diagnosis Related Groups (DRGs). Walter J. McNerney refers to DRG as a health care "catchword" which symbolizes a period of major, almost daring, changes in the financing and delivery of health care services (Spiegler and Kavaler 3). Clearly, given the voluminous amount of literature on the subject, one would readily agree with his evaluation.

The onset of DRGs ended a period of hospital reimbursement based on cost for patient care as determined by individual hospitals (analogous to the Medical Care Composite Unit (MCCU) in Army Medical Treatment Facilities (MTFs)). Hospital reimbursement as a result of the Medicare Prospective Payment System (PPS) is based on the patient's diagnosis, regardless of the resources used in delivering care to the patient. The PPS offers rewards of increased profits for cost effective care by severing the link between the provision of services and payment for them (Schramm 1681).

The potential for great financial loses or gains became more apparent as a result of the PPS, and managerial responsibilities increased. Organizations in which management teams evaluated the organization carefully and developed sound management strategies

survived. Surviving organizations became more efficient, emphasizing maximum quality for a minimum cost (Connor 57).

DRGs affect every department in the hospital. Referring to an article in Pennsylvania Hospitals, James T. Ziegenfuss noted that hospital managers of every type filled DRG seminars to learn how to most effectively implement the system in their areas. The author further suggested that DRGs would:

> "Extend their spheres of influence far beyond the finance office ... to the nurse on the floor, to virtually every department head, to patient accounts managers, social workers, utilization review coordinators, medical records administrators, and most importantly, to attending physicians" (2).

This study will address the role of Reynolds Army Community Hospital's (RACH's) Inpatient Medical Records section in preparing for a Department of Defence (DoD) resource allocation model (RAM) based on DRGs. Specifically, the reliability of abstracted and coded medical records data which determines DRG assignment and its affect on resource allocation will be studied.

Conditions Which Prompted the Study

DRGs as a basis for reimbursement in the civilian community were created due to pressures arising from the hospital organizational environment. Referring to Kast and Rosenzwig's environmental characteristics which are outside of the organization. Ziegenfuss suggests that high pressures from the

political, technological, legal, and economic aspects of the environment formed the impetus for changes in the health care industry, and specifically in the reimbursement system (28, 37).

The result of environmental pressures was the Medicare PPS, implemented in 1983. Fiscal year 1989 (postponed from a 1987 mandate) is the year by which DoD must respond to some of the same environmental pressures as civilian hospitals have done since 1983 (Principe et al., 3).

The National Defense Authorization Act for Fiscal year 1987 mandated the Secretary of Defense to establish by regulation the use of Diagnosis Related Groups as the primary criterion for allocating resources to health care facilities of the uniformed services. (Nat. Def, Auth. Act FY 1987). The act also required that implementation plans be addressed.

Implementation plans for the DoD DRG based resource allocation model (RAM) must address the role of medical records at all levels. According to Spiegel and Kavaler, "Medical records are the cash register operators for the hospital" (195). Accounting experts suggested that the medical records department is "the basis for financing the hospital" (Medical Records, 1983 20).

Prior to the PPS, the medical record served as a legal document, a research tool, and a record of medical intervention. The coded information was rarely used as a basis for payment (Currie 25). Under a DRG-based reimbursement plan, the principal diagnosis submitted by the hospital is the primary determinant of the amount of reimbursement. The principal diagnosis for

submission to financial intermediaries is generated in the medical records department. Information abstracted from the patient's medical record determines the principal diagnosis. To maximize hospital resource allocations the data must be coded properly. It is clear that the quality and reliability of medical records data is of paramount importance when resources are allocated by DRGs.

Hospital administrators must be assured that the medical records department is capable of functioning in a manner which generates appropriate data to maximize the hospital's allocation of resources. Accurate clinical, statistical, and financial data is needed.

COL Thomas G. Munley, Chief of Staff, Health Services Command (HSC), suggested in memorandums written to HSC Medical Treatment Facility (MTF) commanders that in preparation for DRGs, "attention to the accuracy of MTF medical records data cannot be over-emphasized (August 1988). COL Munley further emphasized:

> "All diagnoses, procedures, complications, and comorbidities associated with a patient's stay must be properly recorded in the inpatient treatment record (ITR) and on the ITR coversheet in order to receive full DRG credit. Incomplete and/or inaccurate records and reports will adversely affect your relative case mix index and consequently the manner in which you are resourced" (October 1988).

Data collected during FY 89 will provide information to begin trend analyses to improve and expand the DoD DRG Resource

Allocation Model (RAM) (Mayer 1). It is imperative that RACH assess the data which forms the basis for financial allocations to ensure accurate trend analysis.

Background Information

Reynolds Army Community Hospital (RACH) is located at in Fort Sill, Oklahoma. As the largest component of the Fort Sill MEDDAC, RACH is responsible for the provision of inpatient and outpatient health care to 22,198 active duty soldiers, 23,833 active duty family members, and 21,425 retired military members and their families. Occupational Health Services are also provided to 7,974 civilian employees.

To accomplish the mission of providing high quality care in an ever-changing environment, several projects are underway at RACH. A major two-phase replacement hospital construction project is ongoing. Phase One, which will include both the outpatient health care and the hospital administration areas, is expected to be completed by the Summer of 1989.

In addition to massive transition activities at RACH, there are initiatives to increase the scope of services provided, and reduce expenditures on referral services. Included in these initiatives are increased partnership agreements, contracted services, and negotiated agreements to reduce supplemental care expenditures.

The Catchment Area Management Demonstration Project (CAMPO) will be tested at RACH. It is expected that through local

control of health care funds and creative health care delivery, quality health care will be delivered more efficiently and overall health care costs will be reduced. Anticipating operational changes which will result from a DRG resource allocation model, the management team at RACH is responding proactively. They chose to evaluating the Inpatient Medical Records section of the Patient Administration Division, specifically as it relates to data quality.

Within the Inpatient Medical Records section there are six medical records technicians (coders) which include the Medical Records Librarian (supervisor). The supervisor is an Accredited Records Technician (ART). The remaining five coders are not credentialed. Competency levels and dedication to producing quality medical records data was thought to be high in the RACH Inpatient Medical Records section; however, efforts were made to validate data quality and reliability on which resource allocation depends.

Overt efforts by the RACH management team to ensure the delivery of high quality health care in an efficient manner suggests that proactive DRG planning is in keeping with the philosophy of the Military Health Services System (MHSS), the Army Medical Department (AMEDD), and RACH.

Statement of the Problem

This study was conducted to determine the reliability of abstracted and coded medical records data which determines DRG assignment and its potential effect on resource allocation at Reynolds Army Community Hospital (RACH).

Objectives

The objectives of this study were to:

1. Conduct a literature review regarding:

   a. The background of the DoD DRG mandate and proposed implementation.

   b. Institutional implementation of DRGs.

   c. DRGs and medical records department responsibilities.

   d. Medical records data quality and reliability in determining DRG assignment and hospital reimbursement.

2. Obtain RACH coding and DRG assignment data through the Patient Administration Systems and Biostatistical Agency (PASBA), from the Individual Patient Data Systems (IPDS) for a sample size which was representative of RACH patient discharges during the second, third, and fourth quarters of fiscal year 1987.

3. Select the data elements to be abstracted and coded.

4. Determine the abstracting and coding proficiency of the independent ART abstracting and coding records selected for the study sample.

5. Reabstract and recode the sample records by an ART, utilizing:

a. The Codefinder™; a computer software program which selects diagnostic codes and offers the coder greater accuracy and ease of use than a manual coding system.

b. The DRG Finder™ (GROUPER); a computer software program which assigns an appropriate DRG to abstracted and coded data.

6. Identify discrepancies between assigned diagnostic and procedure codes of the IPDS data set and diagnostic and procedure codes generated by an independent ART.

7. Identify the reason(s) for discrepancies between the assigned diagnostic codes of the IPDS data set and the independent ART's data set.

8. Identify discrepancies between DRG assignment of the IPDS data and data generated by an independent ART.

9. Identify the reason(s) for discrepancies resulting in DRG assignment changes.

10. Determine resource allocation discrepancies based on DRG discrepancies.

11. Determine the statistical significance of identified resource allocation discrepancies.

12. Make recommendations to improve the accuracy and reliability of RACH abstracted and coded medical records data which determines DRG assignment and eventual resource allocation.

Criteria

An overall sample discrepancy rate between the IPDS data set and data generated by the independent ART which was less than or equal to six percent was acceptable for this study. A DRG assignment discrepancy rate of five percent or less between the two data sets was acceptable. Discrepancy rates which did not exceed the stated criteria substantiate the data's reliability for determining DRG assignment.

Criteria for this study was developed by the researcher. A review of the literature which included studies conducted by the Institute of Medicine (IOM), the Monthly Peer Review Organization (PRO) Data Summary Report, published by the Health Care Financing Administration, and coding error standards for individual MTFs suggested by the Patient Administration Division. Health Services Command (HSC), formed the basis for the criteria developed.

The National Center for Health Statistics (NCHS) standards for medical and non-medical abstracting error rates, accepted with a .95 probability, were used by the Institute of Medicine (IOM) when studying medical records data quality, (1980 19-20). Acceptable discrepancy rates for non-medical and medical data in the IOM study were:

Non-medical

abstracting - 1%

coding - 5%

Medical

abstracting - 1%

coding - 5%

The HSC coding error standard is six percent or less (Adkins).

DRG assignment error rates as reported in the 24 October, 1988 Health Care Financial Administration's Monthly Peer Review Organization (PRO) Data Summary Report for combined preadmission/prepay and retrospective Medicare claims were (A5):

National DRG error rate - 4.76%

Oklahoma DRG error - 4.34%.

Assumptions

Prior to conducting this study, the following assumptions were made:

1. RACH command support of the study would include funding for an independent ART to abstract and code the sample records.

2. A statistically significantly sample of randomly selected records, excluding admissions for absent sick, carded for record, and medical board proceedings would be a valid representation of RACH discharged patients. Admission for absent sick, carded for record, and medical board proceedings were excluded due to the nonavailability of the record at RACH or the fact that the records contain minimal clinical data.

Limitations

Limitations impacting on this study were:

1. Researcher actions necessary to secure funding for an independent ART to abstract and code the sample records had to be in accordance with strict U.S. Army contracting regulations.

2. Research results were limited to, and could only make inferences about, medical records data reliability at RACH.

3. Research results were limited to an analysis of the second, third, and fourth quarters of fiscal year 1987 discharge records.

Review of the Literature

Diagnosis Related Groups (DOD Definition)

DRGs classify clients by demographic and diagnostic variables into clinically comparable groups with similar lengths of stay and intensity of resource consumption. Originally developed for utilization review in the civilian sector, the DRG classification scheme has been adopted as the basis to credit workload and allocate resources within the Department of Defense (DoD) Military Health Services System (MHSS). Under this system, relative workload credit is based on average resource usage within each DRG category. A fixed credit is given for the entire inpatient episode rather than crediting separately each input such as occupied bed day, ancillary tests, and pharmaceuuticals

consumed during the episode. This methodology provides incentives for efficiency and effectiveness in managing the inpatient case and enhances comparisons with patient care in the civilian sector (Mayer 1).

Implementation Of The Civilian DRG Based PPS

As stated previously, the PPS is responsible for significant changes in the way hospitals do business. Health care executives interviewed by Kovener and Palmer suggested many ways in which they were responding to the PPS. Productivity on a per case basis became more important than previously was expected. To achieve better productivity, emphasis was placed on department activities in an effort to increase the timeliness of activities and the coordination of various departments. Decisions as to what to "make or buy" were addressed. In some instances it was found to be more economical to contract for services traditionally provided in-house. The respondents also stressed the need for improved cost accounting to evaluate the options available (74).

Hospital executives also expected to develop alternatives to acute care, to include increased outpatient activities and arrangements with nursing homes to guarantee the availability of beds to hospitals (Kovener and Palmer 75). Much attention was also given to specializations. Decisions as to what services must be offered, ones which can be offered, and those which should not be offered to the community had to be made (Basset 3).

Hospitals which survived well under the PPS were creative while assessing unique institutional needs.

Much attention was given to the medical records department in an effort to merge financial and clinical data (Kovener and Palmer 44). Medical records data was also used to establish the DRG mix, monitor physician utilization patterns within DRGs, and evaluate differences between physician patterns (Kovener and Palmer 44). Due to the increased importance of medical record data, plans were made to address issues of medical records accuracy.

Results of hospitals efforts to respond to positive incentives of increased profits for more efficient delivery of health care resulted in several changes in health care delivery. Hospital admissions have decreased, as has the length of hospital stays (Schramm 1681). A concurrent increase in ambulatory care services has been experienced (Schramm 1682). There has also been an increase in discharges to skilled nursing facilities. Peer review organizations and insurance companies have played a major role in the more efficient delivery of health care. They monitor the utilization of hospital services, and physician practice patterns.

Fears of reduced quality of care have been voiced, but have not been scientifically validated. Schramm, however, points out that quality of care evaluations based on medical record audits are lacking. Schramm suggests that studies demonstrate the mortality rate among the elderly has declined; however, readmission rates have increased. The author suggests there is a

need for studies to address the issue of the quality of medical care explicitly (1681).

Implementation Of The Military DRG Based PPS

As in the civilian community, the legislative mandate to allocate resources based on DRGs will be implemented. Unlike the civilian community, however, the individual MTF lacks the management capabilities to fully realize the system's goals (Mayer 2).

Five obstacles to implementing a DRG-based allocation model in the military services were identified by Olsen (1):

1. The current structure only allows allocation of a fraction of resources (supplies) used in providing care.

2. Due to the lack of a single appropriation for all resources which allows reprogramming across appropriations military managers cannot respond to incentives created by DRGs in the civilian community.

3. There are vastly different accounting systems for the three services.

4. Individual services fear the potential adverse impact additional consolidation might have on service unique medical care requirements. Support provided MTFs due to membership in a specific service may cease, and generate resistance to a DRG-based resource allocation model.

5. There is no compatible reporting system among the services to evaluate budget and workload performance.

The final FY 89 Military Health Services System (MHSS) DRG resource allocation model attempts to speak to several of the aforementioned concerns. A phased approach by DoD to prevent vast changes in MTF resource allocation is planned. MTF managers have been given greater flexibility in health care delivery options. There is a service neutrality adjustment in the allocation model to prevent excessivve turmoil within the services due to allocation changes. There remains the inability at the MTF level to monitor case level trends and the lack of direct rewards for efficiency at the MTF level. Currentlv a negative incentive approach which motivates MTF managers to struggle to prevent cuts in resources is operational. Plans to address a more positive approach are needed.

Given the differences between the civilian and military structure, the bottom line remains the same; survival under a PPS based on DRGs. The Tri-Service Performance Management Working Group (11) identified an initial MTF approach to the DRG legislation and adaptation. Issues ranging from DRG-necessitated medical record policy changes to education and training were addressed.

Impact of PPS on Medical Records

While not attempting to minimize the effect of the PPS on every department in the hospital, this researcher believes the medical records department is most affected. The drastic changes

required in the medical records department to effectively prepare for a PPS is also supported in the literature (Nathanson 50).

Schraffenberger directed a questionnaire to 775 medical records directors of general medical and surgical hospitals participating in the PPS. She concluded that medical records departments have become more complex and have assumed many new responsibilities (22). Due to the increased complexity of medical records tasks medical records directors responding to Schaffenberger's questionaire indicated a greater involvement in the hospital's financial and business operations. This study indicated that a greater percentage of medical records directors are now reporting to the finance department. Prior to PPS the percentage was 4% as compared to 19% after the PPS was adopted (22). Respondents also reported that one or more management reports are the responsibility of the medical records department. The medical records department is the primary contact with the Professional Review Organization (PRO), and is involved in issues which directly affect the financial stability of the organization (29).

Other changes according to Schraffenberg, were an increase in the use of computer systems in medical records departments in response to the PPS, they also revised, and more stringently enforced existing rules to increase data quality (24). Schaffenberger also noted that more staff, especially credentialed staff and coders, were added in response to the PPS.

A qualified and well-informed medical records staff is needed to meet increasing demands for more accurate medical

records data. The ever-evolving DRG developmental process also requires a qualified staff (Averill 76). The increased importance of medical records under a PPS will increase the stature and salary of medical records staff requiring organizational planning to meet the need (Kovener and Palmer 44).

Green and Benjamin suggests that the presence of qualified staff is essential to producing quality data (38). In a study to assess the impact of medical records credentials on data quality, medical records departments with the highest levels of coding agreement were found to employ a greater percentage of credentialed coders (38).

Many concerns of the AMEDD Task Force on Management were focused on medical records and improving data quality. Issues specifically identified were (1-2):

1. The DoD number of medical records personnel compared to civilian hospitals of comparable size.

2. The salaries of coders.

3. The training needs of coders to increase coding skills.

4. The development of a career path for medical records personnel to result in competitive salaries and career enhancing opportunities.

5. The greater use of enlisted military personnel (71G) to concentrate on enhanced coding proficiency.

6. The feasibility of offering commissions to Registered Records Administrators (RRAs) with specific career tracking in medical records management.

To date there have been minimal DoD policy changes in response to the task force's suggestions. The task force suggested that DRG data from the Patient Administration Systems and Biostatistical Agency (PASBA) be distributed to all levels to include the MTF. Clearly the need to react to medical records problems has been identified and must be addressed under a DRG-based RAM.

An assessment of the medical record department which evaluates the following major functions is suggested by Flanagan and Sourapas (15).

1. Admitting process
2. Utilization review
3. Record completion and delinquency
4. Transcription
5. Coding accuracy
6. Management control and reporting

In addition to assessing the medical records department internally, the writers suggested that good interdepartmental relations be developed which identify problem areas, such as:

1. Admitting
2. Finance
3. Patient accounting
4. Nursing
5. Medical director
6. Medical staff
7. PSRO (PRO)
8. Information systems or data processing

ICD-9-CM Development

Under the DRG-based RAM, resources are ultimately based on codes assigned to patient diagnoses and procedures abstracted from the medical record. Coding is transferring verbal descriptions of diseases, injuries, and procedures into numerical designations (Finnegan 63).

Coded data has different meanings and significance depending on the individual's needs. Physician codes may be applied to diagnoses. Health planners may be interested in diagnoses or procedures applied to census tracts, while the financial officer is interested in reimbursement issues (McCaffey 22).

The coding system used by DoD is the International Classification of Diseases, 9th revision, Clinical Modification (ICD-9-CM). The current version of the ICD-9-CM is a three-volume alphabetic and tabular listing containing over 10,000 codes. The ICD-9-CM has been used almost universally for classifying diagnostic and procedural data since it was adopted by the Department of Health, Education and Welfare, on January 1, 1979 (Murphy-Muth 37).

The ICD-9-CM resulted from many efforts to classify diseases in a systematic manner which allows the collection and analysis of data for morbid conditions. The International Classification of Diseases (ICD) Manual describes attempts made by Francosis Bassier de Lacroix and Linnaeus in the 18th century to classify diseases systematically. Both men published comprehensive treatises to clarify the process of disease classification

(VIII). The most widely used classification system at the beginning of the 19th century was developed by William Cullen (VIII).

As efforts continued, William Farr and Marc d'Espire were requested by the first International Statistical Congress to prepare a uniform classification of causes of death. The two systems were used to comprise a list of 138 rubics (ICD X). Farr's system differentiated general diseases and those localized to a particular organ or anatomical site (ICD X).

James Betilion developed the International Classification of Causes of Death, which became the international standard in 1900 and has been revised approximately every 10 years (ICD X). In 1948 a cooperative relationship between the National Statistical Institutions and the World Health Organization was developed. The two organizations began to share vital and health statistics, making a standardized classification system even more important (ICD XII).

As revisions are made to the International Classification of Diseases, the emphasis is on keeping in touch with modern clinical concepts, hence Clinical Modifications (CM). The need for greater specificity is also addressed as reflected in a five-digit version of the ICD-9-CM (ICD XV). Concerns that data quality could erode further as coding classifications become more complex were expressed by Williams and Latessa (42). They suggest aggressive educational intervention, which in their study resulted in significant improvement in diagnosis coding (46-47). It is expected that revisions of the ICD will continue. The

ICD-10-CM is discussed in the literature reviewed by this writer (Servais 2). Plans to aggressively address the issue of medical records staff continuing education as coding principles change must be a management priority.

Military Unique Codes

ICD-9-CM codes were modified to meet the needs of the three services. The codes were changed at the fourth and fifth digit level, or specific codes were added for the specificity deemed necessary by the services. Codes for Drug and Alcohol, Hepatitis, and AIDS are coded differently in MTFs (DoD Dis. and Proc. Class. 3-1). A study which mapped AMEDD data from the ICD-9 diagnosis to the ICD-9-CM was completed in 1987 (Baker 6-1). Current guidance is that ICD-9-CM will be used as it is in the civilian community, with extenders to collect DoD unique data. Efforts are expected to continue to reduce differences between the civilian and DoD coding principles.

Medical Records Data Sets

Another effort to standardize data on which vital and health statistics are based is demonstrated by the Uniform Hospital Discharge Data Set (UHDDS). The UHDDS identifies and defines data elements which must be reported when a patient is discharged from the hospital. Data items include:

Personal identification Date of birth

Sex	Race and ethnicity
Residence	Hospital identification
Admission and Discharge	Physician identification
Date	Attending and operating
Diagnosis	Procedures and dates
Disposition of patient	Expected principal source of payment

Definitions to code medical records are derived from the UHDDS, such as the principal diagnoses and procedures.

Schraffenberg (December 1986, 47) described a "Health Record Core Data Set" to help practitioners assess the completeness of the institution's information and plan for the future. The forty-five data elements suggested by Schraffenberg are recommended by various standardized data bases, to include the UHDDS. While data element needs must be assessed, physicians and medical record practitioners must remember that DRG validation is conducted in a manner consistent with three standards: the ICD-9-CM established coding guidelines, UHDDS data element definitions, and accepted principles of coding diagnostic and operative information (Barnes 106).

Coding Medical Data

The reliability of medical records data became much more significant under the PPS. Abstracting and coding procedures must produce accurate data (Bennet 337). Correct codes must be assigned for appropriate DRG assignment, which requires

appropriate abstracting to identify elements which determine the most appropriate codes. Abstracting requires that the entire medical record be reviewed to determine if there is documentation to substantiate the codes, and ultimately, the DRG assignment. Hospitals which tend to be underpaid are those which continue to report inaccurately, usually resulting in understating their case complexity (Ertel and Harrison 19). Corn suggests that there is a need for standard rates of error (417). Corn's research demonstrated that quality control mechanisms varied greatly among abstracting services. Institutions must strive to reduce their medical records data error rates to maximize reimbursement and to produce quality data from which management decisions are be made. Universal coding error rates are lacking, making it necessary that each institution identify acceptable rates individually.

Coding is a relatively subjective task, which is complicated further by varying degrees of coder skill levels (Thompson and Loup 46). Coder training generally consists of direct instruction from a supervisor, who monitors the new coder's coding for a period of time (Murphy-Muth 49). Accredited Record Technicians (ARTs) have extensive coding training, physiology courses and sit for the ART exam (Murphy-Muth 50). One can readily see that an experienced, credentialed ART should be better qualified for the coding function than coders without formal training. ARTs are trained to recognize and reduce the causes of coding errors.

Thompson and Loup grouped coding errors into three categories: clerical, judgmental, and systematic. Clerical

errors are due to misreading information or transposing numbers by coding personnel. Approximately 2% of coding errors are clerical. They may be reduced by on-line computer edits of data (Thompson and Loup 47).

Judgmental errors occur when the coder makes the wrong decision. Estimates are that 10% of coding errors result from judgmental errors. They are best reduced by eliminating, as much as possible, the opportunity or need for making judgments (Thompson and Loup 47). It should be noted that medical records coders of all educational backgrounds with whom this researcher conferred agree that there will always be an appreciable amount of coding disagreement among coders based on judgement. The coders also agree that automated encoders will assist in reducing the problem of coding disagreement.

Errors attributable to systematic problems account for 70% of coding errors, and are due to incorrect procedures used for carrying out the coding task. An assessment of current medical records department standing operating procedures (SOPs) and policies with strict quality control will result in their reduction (Thompson and Loup 48).

To further delineate reasons for coding errors Thompson and Loup assessed coding errors associated with assigning principal diagnoses and procedures. Four problems have been identified as follows (50):

1. The selection of incomplete or incorrect terminology, leading to an unspecified code. The authors suggests that unspecified diagnosis and procedure codes are incomplete and

should not appear. Specificity in assigning codes results in more accurate medical record data.

2. The wrong code is chosen due to failure to adhere to exclusion of a certain diagnosis in the presence of other codes. Many rules are not defined in the code book, but require an experienced and well-informed coder.

3. An additional code is required but not present. Some situations require the use of two codes.

4. There are sequencing errors which result from incorrectly listing the principal diagnosis and procedure according to Uniform Hospital Discharge Data Set (UHDDS) definitions. The principle diagnosis and procedure should be listed first.

The four problems identified by Thompson and Loup require coders which are trained in the appropriate use of the ICD-9-CM manual, and informed of additions and changes during the 10 year period between updates of the manual.

The relative importance of specific errors in data was discussed by Corn (353). All DRGs depend on the principle diagnosis, 80% depend on the principle procedure, 45% on secondary procedures, 45% on secondary diagnosis, 20% on age, and 10% on secondary procedures. Corn concluded that there is often a compensating effect when underpayment and overpayment reduce the significance of errors of reimbursement (354). Because DRGs are sensitive to errors in patient data, the prudent institution would choose not to take a chance on this compensating effect,

especially in reference to the principal diagnosis and procedure (see Appendix B).

There is significant confusion regarding the terms principal and primary diagnosis. The primary diagnosis may or may not be the principal diagnosis, even if the primary diagnosis was the most resource intensive. If a patient is admitted to the hospital for cataract surgery, but sustains a fall and a fractured hip, the principal diagnosis remains cataracts, although care for the fractured hip used the greatest amount of resources.

Causes of improper designation of the principal diagnosis include inadequate documentation, incomplete review of the medical record, and incorrect application of the UHDDS guidelines (Campbell and Johnson 44). The principal diagnosis is the condition chiefly responsible for the admission of the patient to the hospital for care. The primary diagnosis is the condition whose treatment resulted in the greatest resource consumption during the patient's hospitalization.

Frederick Connel et al.,analyzed a sample of diabetes mellitus records, finding that 12.6% of the diagnoses could be classified as ambiguous. Ambiguous situations require the knowledgeable coder to use judgment which legally and ethically optimize reimbursement without jeopardizing the quality of the data generated. Connel's sample demonstrated a 34% increase in principal diagnosis weights when diabetes is the principal diagnosis as opposed to being the immediate complication which

leads to amputation surgery, such as when cellulitis is listed as the primary diagnosis (22).

DRG Creep

The University of California at San Francisco (UCSF), when preparing for the PPS, discovered the potential for DRG creep. DRG creep occurs when diagnoses are resequenced to reflect the most costly diagnosis as principal, even if it fails to meet the UHDDS definition of principal diagnosis. By resequencing the first two diagnoses of patients who had a major surgical procedure along with chronic renal disease, it was possible to shift the costliness of the case mix index by over $800,000. In many of the cases, the renal disease was not the principal diagnosis (Simborg 1603).

A 20.8% error rate was reported by David C. Hsia who found that small hospitals had a higher error rate (354). He suggested that DRG creep may have had a bearing on the results, noting that 61.7% of the changes had resulted in a higher weight being assigned. Of the 1372 changes, 661 were due to "mis-specification", 164 due to miscoding, 373 due to resequencing, and 176 listed as "other".

DRG creep is illegal and unethical. It must be avoided by medical records personnel. Utilization of comorbidities, complications, advanced age, special conditions, and procedures based upon accepted coding guidelines has the potential to show legitimate, ethical payment optimization. Deborah Green, in her

article on coding quality control, shows a 25% potential increase in reimbursement (2). She suggests making a complete table of DRGs with optimizing potential, noting weight differentials, and identifying priority categories for review (8).

Data Reliability

Many studies have been conducted to address the issue of medical records data reliability. The most publicized and often referred to are the three Institute of Medicine (IOM) studies published in 1977 and 1980. All three studies found that the data being evaluated was unreliable for the stated purpose. All three studies were independently reabstracted due to "suspect" results of reabstracts completed by hospital personnel (1977, 7). The UHDDS data elements were incorporated into the studies.

The results of the Institute of Medicine Studies are as follows:

1. February 1977. "Reliability of Hospital Discharge Abstracts." Demographic data was shown to be highly reliable with a 97.7% - 99.7% agreement between IOM reabstract and original abstract. All principal diagnoses when codes were compared to four digits, showed agreement of only 62.2% of the records. For all procedures there was 73.2% agreement (47).

2. November 1977, "Reliability of Medicare Hospital Discharge Records." Demographic data was shown to be highly reliable with a 99.3% - 99.5% agreement. Principal diagnoses, when compared to the fourth digit, showed 57.2% agreement (61).

Additional diagnoses were accurately noted on 74.5% of the records. Agreement for principal procedure was 78.9% of the cases (62). The researchers found that discrepancies in the principal diagnosis increased as the coding refinement increased from three-digit, four-digit, or broader diagnostic categories (25). The percentage of cases with no discrepancies increased when there was no additional diagnosis (63). A more complete review of the medical record was suggested as a means to reduce the frequency of ordering and coding discrepancies (29).

3. 1980, "Reliability of National Hospital Discharge Surgery Data Study." Demographic data was highly reliable, with a 92.5% - 99.5% agreement (50). Agreement for principal diagnosis with all diagnoses combined was 63.4% when four-digit diagnostic codes were applied (98). Principal procedure agreement was 71.4% of the cases reviewed (100). Again the researchers stressed the inadequacies of the face sheet and the need to review the entire record. When the face sheet was supplemented with the discharge summary, adequate information for abstracting and coding was increased from 47.3% to 85% for records reviewed. Coding and ordering disagreements accounted for most principal diagnosis discrepancies (99). Principal procedure discrepancies resulted most often from disagreement over whether a procedure was important enough to be abstracted and coded (100).

Demlo et al., responded to the first two IOM studies. The authors affirmed their concerns and "serious reservations about the adequacy of existing hospital discharge information" (1978,

1003). They concluded that, based on the IOM results, it is essential that diagnostic information be accurately coded to the fourth digit (1978, 1004). In 1981, Demlo and Campbell noted that there had been no significant improvement in data reliability over the years between the publishing of the three IOM studies (1981, 1030). The authors suggested including dispositions on the face sheet and an assessment of the reliability of five digit coding (1981, 1039).

Savitt and Duggar (1983) compared 100 Medicare bills with discharge information taken from the medical records involved. The authors found an 18.3% error rate in the principal diagnosis with a 16.4% increase in the error rate between three digit and four to five digit diagnostic categories. A 26.6% error rate was found in principal procedures.

Schraffenberger (Jul. 1986, 15) reviewed hospital claims and medical records for Medicare payment for DRG 88, Chronic Obstructive Pulmonary Disease (COPD). Sixty percent of the cases were erroneously assigned to DRG 88. Twenty-seven percent of the errors were due to incorrect principal diagnosis, 17% due to lack of specificity of diagnosis, 15% due to the coder improperly translating the physician's narration, and 30% due to improper sequencing (Jul, 1986 15). The original data set had been obtained from the face sheet as opposed to a full record review by the researchers.

Reimbursement Impact of Coding Errors

Studies which address the financial impact of DRG misassignment have been conducted by several researchers. Andrew Bindman, et al., found that 33% of the records audited were assigned a different DRG. The reassignment resulted in a 8.9% increase in income to the hospital of $12,170 (243). Harvey D. Doremus and Elana M. Michenzi (1006) demonstrated a 37% disagreement in DRG assignment. The results were that 51.5% of the DRGs had higher weights and a $177,201 higher level of reimbursement based on the abstracted data.

Johnson and Appel compared hospital case mixes based on billing data submitted and the reabstracting of the medical record. There was a DRG agreement of 49.4% in 1980, and 53% in 1981 (130). Unlike Hsia, they found a greater disagreement in DRG assignment, possibly due to case complexity, in larger tertiary hospitals. The average hospital was underpaid by 4.1% or $300,000 (132). Changes in Medicare reimbursement ranged from a gain of 89% to a loss of 26% (133).

Encouraging assessment of the current status of medical records which includes the accuracy and efficiency of clinical coding, Currie compared quality and accuracy of hospital data from medical records abstracts and patients' bills. Currie found that the principal diagnosis, if incorrectly coded, could understate revenues by 15.32% (27). If other diagnoses which affect DRG assignments are not coded a potential for a 23.8% understatement exists.

In a study conducted by Ellen Cohen, et al., 1,070 Medicare and Medicaid cases were reviewed (239). Of the records, 743 had a coding error in at least one data element. The average principal diagnosis discrepancy was 20.2% and 9.9% for the principal procedure (241). The data discrepancies resulted in 180 changes in DRG assignment (17.5% of all cases). Errors in case mix presentation could result in Medicare and Medicaid reimbursement overstatement of more than $1 million, while other reimbursements may be understated by more than $800,000 (243).

DRG Assignment

Data which determines DRG assignment must be accurate, and is a dual responsibility of both the physician and the medical records personnel. Ertel and Van Harrison refer to it as a two staged process: 1) The physician records data accurately on medical records, and 2) Medical records personnel must abstract the data required and code it properly. They suggest that physicians regard the quantifying labels attached to clinical data largely as "reporting artifacts which have little to do with the real business of giving care" (12).

The process of DRG assignment in civilian hospitals is as follows (Murphy-Muth 24-26):

1. The patient is discharged.

2. The physician assigns the diagnosis to the medical records face sheet and the attestation statement.

3. The Medical Record is abstracted and the diagnosis and procedures are coded by medical records coding personnel.

4. Codes and diagnoses are forwarded to the business office.

5. The Business office puts the codes and diagnosis on the patient's bill.

6. The bill is transmitted to the Medicare fiscal intermediary.

7. Medicare transfers billing information into the computer.

8. GROUPER, a computer software program sorts the patient data into a DRG.

9. Hospital reimbursement is determined.

A predetermined hospital specific reimbursement schedule based on a variety of criteria such as case mix index, teaching status, and whether the facility is rural or urban allows the hospital to determine reimbursement for individual cases. The majority of hospitals use automated encoder and GROUPER software which identifies reimbursement after step 3. The opportunity to optimize reimbursement can be evaluated at that point.

GROUPER follows an algorithm (logic) which asks a series of questions and assigns a DRG (see Figure 1).

A patient's diagnosis is ungroupable if:

1. The operating room procedure is unrelated to the principal diagnosis.

2. An invalid discharge diagnosis has been assigned as the patient's principle diagnosis.

FIG. 1
AN EXAMPLE OF DRG LOGIC (PNEUMONIA)

ICD-9-CM Codes 4810 and 4019 ARE SORTED
TO ONE OF 23 MAJOR DIAGNOSTIC CATEGORIES

RESPIRATORY SYSTEM MDC (MDC#4)

WAS AN OPERATING ROOM PROCEDURE PERFORMED?

(NO)

MEDICAL SIDE of MDC

WHAT IS THE PATIENT'S PRINCIPAL DIAGNOSIS
(PNEUMONIA)

WERE THERE COMPLICATIONS OR COMORBIDITY (CC)

(NO)

WHAT WAS THE PATIENT'S AGE (0-17, 18-69, >70)
(45)

WHAT WAS THE PATIENT'S DISCHARGE STATUS
(TRANSFERRED,HOME,DIED,AMA)
(HOME)

DRG ASSIGNMENT - DRG 90

POTENTIAL PNEUMONIA DRGs

DRG 91 SIMPLE PNEUMONIA AND PLURISY AGE 0-17 ($1,591.79)

DRG 90 SIMPLE PNEUMONIA & PLEURISY AGE 18-69 W/O CC ($2,377.13)

DRG 89 SIMPLE PNEUMONIA & PLURISY AGE >69 &/OR CC ($3,887.31)

3. GROUPER finds the patient's age, sex, or discharge status to be invalid.

Computer Assisted Encoding

Morgan (1982 45) defines encoding as the process of assigning a code number to a diagnosis or surgical procedure. Medical records coders use coding books as references, to facilitate the encoding process. Several factors are identified which determines the accuracy of the encoding process. First, the skill level of the coder, secondly, the specificity of the code being used and thirdly, the similarity of the text found in the code book to that used by the physician when documenting in the patient's medical record (Morgan 450).

To minimize coding inaccuracies hospitals preparing for the PPS invested money and personnel in automated encoders. Automated encoders while automating the ICD-9-CM code books; must also do more to increase coding accuracy. Six minimum criteria for computer-based coders were identified by Gabrieli and Saumby (53). The system must be:

1. Accurate,

2. Useful, while serving all legitimate users to include epidemiologist, clinical researchers, fiscal analyst, and administrative planners,

3. Consistent, enabling judgement-free, uniform data with a low error rate,

4. Cost effective, and should be less expensive than the current manual system,

5. Expeditious, in which coding is prompt and simple, and

6. Current including all new terms.

Morgan suggests that the automated encoder should give an indication of codes specifically excluded or prohibited by PPS. It should alert the coder to potential complicating conditions and closely related differential diagnostic possibilities. Accompanying explanatory phrases indicating disease mechanism, etiology and/or quantification should also be included.
The language must be that which physicians use and allow the coder to enter key words perceived as the most unique identifier of the disease condition and procedure being described by the physician (1986 24).

Automated encoders are suggested as one of the key mechanisms for improving coding accuracy (Morgan 1982 47). It cannot, however, assign the principal diagnosis. It can provide a logical framework which suggest elements to look for in the record that will differentiate between possible principal diagnosis (Morgan 1986 25).

Automated encoders are planned for MTFs during the implementation phase of the DRG RAM. It is imperative that the quality of coding and medical records data be improved soon due to their major role in hospital survival under a PPS.

Research Methodology

This study was conducted using the following research methodology:

1. DoD. U.S. Army, Health Services Command and Fort Sill MEDDAC regulations published to protect the integrity of the medical record and privacy of RACH patients were reviewed and complied with. Permission to conduct the study using RACH medical records was obtained from the Department Of The Army, Office Of The Surgeon General. Patient Administration Division. The Commander of RACH also consented to conducting the study.

2. Military and civilian literature which addressed DRG implementation, particularly as it relates to medical records departments was reviewed.

3. An appropriate sample size representative of the identified population was statistically determined utilizing a research program and formula developed by Thomas R. Renckly (25), (see Figure 2). Three hundred and sixty five medical records based on a population of 7,370 discharges during the second, third and fourth quarters of FY 1987 excluding previously identified classes of admissions were determined to be an adequate sample. The researcher was 95% confident that a randomly selected sample of at least 365 records was an unbiased representation of RACH's abstracting and coding accuracy leading to DRG assignments during the researched period. Random sample selection was accomplished by PASBA utilizing the last two digits

Fig. 2
Sample Formula

$$n = \frac{NZ^2 \times .25}{[d^2(N-1)] + (Z^2 \times .25)}$$

n = Sample Size Needed

N = Total Population Size (known or estimated)

d = Precision Level (.05)

Z = Factor For Confidence Level (1.96)

Source: Renckly, Thomas R. The Air University Guide to Designing and Conducting Studies Sampling and Surveying Handbook. Maxwell Air Force Base: 1986.

of the beneficiary's social security number until 400 records were selected.

4. A qualified ART was selected to abstract and code the sample records. Prior to selecting an ART the following criteria for selection was established:

1. The ART had to have experience abstracting and coding for the PPS.

2. The ART must demonstate an interrater reliability for coding of 85% or greater.

The ART selected demonstrated an interrater reliability of 99% with the PRO when coding for DRG reimbursement ($r = .995$; $r^2 = 99\%$). An interrater reliability as demonstrated by a correlation r of .85 and an r^2 of 72% was considered satisfactory to establish reliability (Amatayakul 28-29).

5. The sample records were retrieved from the RACH medical records department utilizing the sponsor's social security number and the beneficiary's hospital register number.

6. Three hundred and seventy two randomly selected medical records were abstracted and coded by an independent ART utilizing the Codefinder™ encoder and DRG-finder™ (GROUPER) software. Data elements retrieved from the medical record included:

Age	Gender
Principal diagnosis	Principal procedure
Secondary diagnosis	Secondary procedure
Additional diagnosis (3-5)	Additional procedures (3-5)
Complications	Comorbidity
Discharge status	

7. The reason(s) for each record's discrepancy were determined, using the medical record analysis form (See appendix C).

8. The sample discrepancy rate was determined, using the sample discrepancy sheet (See Appendix D).

9. The sample DRG assignment discrepancy rate and reason(s) for the DRG assignment discrepancy was determined using the sample discrepancy sheet (Appendix D).

10. Abstracting and coding data was reviewed by an ART. The reviewing ART was also the supervisor of the inpatient medical records department of an Army MTF in the RACH peer group.

11. The sample's original and revised DRG sample supply resource allocation discrepancy and the statistical significance of that discrepancy was determined.

12. The sample's original and revised DRG reimbursement discrepancy was determined using the DRG reimbursement rates of a local Oklahoma for-profit, non-teaching, civilian hospital.

13. All research findings were analyzed and recommendations, based on the findings and the literature review, were presented to the Commander, RACH.

14. References from documents, journals, books and interviews used during the course of the research were documented using the 1984 edition of the Modern Language Association Writing Style Manual.

CHAPTER II

DISCUSSION

Sample Breakdown of Data Agreements/Disagreements

During the second, third and fourth quarters of FY 1987, 7,370 patients were admitted to RACH. Three hundred and seventy two medical records of the 7,370 admissions were retrieved as the sample for this study. The sample was determined to be representative of RACH abstracted and coded medical records data (Renckly 89). The records were reabstracted and recoded by an independent ART. The sample breakdown is shown in Table 1.

Table 1

Sample Breakdown of Data Agreement/Disagreement

Classification	Number of Records	Percent of Sample
Agreement	192	51.61%
Optional Codes Only	3	.81%
Military Unique Only	2	.54%
Coder Judgement Only	9	2.42%
Coder Disagreement	166	44.62%
No DRG Changes	(125)	(33.60%)
With DRG Changes	(41)	(11.02%)
TOTAL SAMPLE	372	100.00%

Of the 372 sample records there were no discrepancies between RACH medical records data and the independent ART's reabstracting and recoding results in 206 records. There was

total agreement between the two data sets in 51.61% of the sample records. Coding principles and codes which are unique to the military, and resulted in a discrepency are referred to as Military Unique Codes. Military unique codes were found in .54% of the sample records. Sample records, in which the only discrepancy was due to coder judgement and or optional codes accounted for 3.23% of the sample records. Military unique, optional and judgement discrepancies were not counted as coder disagreement for the purpose of this study.

Coder disagreement for the purpose of this study was found in 166 records or 44.62% of the sample records. Of the sample records 33.60% required no change to the DRG assignment, although there was coder disagreement. A change in the DRG assignment resulted in 11.02% of the sample records.

Accuracy of Data Elements

Of the 372 records reviewed 44.62% (n=166) demonstrated at least one discrepancy in one data element (Table 2). The 166 records with discrepancies showed that 56.63% of those records had greater than one discrepancy.

Table 2
Discrepancies Per Record

One Per Record	72 Records	43.37%
> One Per Record	94 Records	56.63%
Total Records W/Discrepancies	166 Records	100.00%

There was a total of 240 coding discrepancies recorded for the 166 sample records with discrepancies. One hundred and eighty two diagnosis coding discrepancies and 58 procedure coding discrepancies were found. The principal diagnosis discrepancy rate was 20.83% of discrepancies noted, with 30.12% of the records showing the discrepancy. There was a 16.25% discrepancy rate for omitted additional diagnoses involving 23.50% of the records. Omission of complications or comorbid conditions accounted for 7.92% of the discrepancies found in 11.45% of the records. Unspecified diagnostic codes accounted for 10.83% of the discrepancies and 15.66% of the records. The discrepancy rate for other diagnostic discrepancies appear in Table 3.

Procedure discrepancies accounted for 24.16% of the discrepancies noted in this study. Principal procedure discrepancy rates were 2.50% of the discrepancies noted in 3.1% of the sample records. Discrepancies resulting from omitted procedures was 12.08% of the sample discrepancies noted in 17.47% of the records. The wrong code accounted for 6.25% of the discrepancies in 9.04% of the records. Other procedural discrepancies including a 2.92% discrepancy rate due to no documentation for the code in the record appear in Table 3.

Discrepancies in DRG Assignment

Of the 166 records with discrepancies, 24.70% (n=41) resulted in a different DRG assignment based on the revised data

TABLE 3
TYPES OF DISCREPANCIES IN ABSTRACTING & CODING

REASON FOR DISCREPANCY	NUMBER OF RECORDS (n) (n = 166)	PERCENT OF RECORDS WITH DISCREPANCIES	PERCENT OF DISCREPANCIES (n = 240)
PRINCIPAL DIAGNOSIS	50	30.12	20.83
SEQUENCING DIAGNOSIS	8	4.82	3.33
* C/C OMITTED	19	11.45	7.92
ADDITIONAL OMITTED	39	23.50	16.25
UNSPECIFED	26	15.66	10.83
WRONG ADDITIONAL	21	12.65	8.75
OPTIONAL CODES	9	5.42	3.75
NO DOCUMENTATION	7	4.22	2.92
CLERICAL ERROR	3	1.81	1.25
TOTAL DIAGNOSIS DISCREPANCIES	n = 182	75.83 % OF TOTAL DISCREPANCIES	
PRINCIPAL PROCEDURE	6	3.1	2.50
PROCEDURE OMITTED	29	17.47	12.08
WRONG CODE	15	9.04	6.25
SEQUENCING PROCEDURE	5	3.01	2.08
CODED NOT DONE	1	.60	.40
NO DOCUMENTATION	2	1.20	2.92
TOTAL PROCEDURE DISCREPANCIES	n = 58	24.16 % OF TOTAL DISCREPANCIES	
TOTAL DISCREPANCIES	n = 240		

* Complications/Comorbidity

(see Table 4). Of the records with a resultant DRG reassignment, 60.98% had more than one discrepancy per record (see Table 5). The RACH records reviewed for this study which had more than one discrepency were more likely to require a DRG assignment change, based on the figures in table 5.

Table 4

Discrepancies and DRG Changes

Result of Discrepancy	Number (n)	Percent of Discrepancies
Changed DRG	41	24.70
No Change in DRG	125	75.30
Total Discrepancies	166	100.00

Table 5

Discrepancies Per Record/DRG Changes

One Per Record	n = 16	39.02 %
> One Per Record	n = 25	60.98 %
Total Records w/ Discrepancies	n = 41	100.00 %

As indicated by identifying types of discrepancies the primary reason for DRG reassignment in this study was incorrect identification of the principal diagnosis (see Table 6). Principal diagnosis discrepancies occurred in 51.22% of the sample records and accounted for 32.81% of the discrepancies found in records with DRG changes. Omission of complications and comorbid conditions was the second most frequently occurring discrepancy, accounting for 14.06% of the discrepancies found

TABLE 6
DISCREPANCIES IN ABSTRACTING & CODING WITH DRG CHANGES

REASON FOR DISCREPANCY	NUMBER OF RECORDS (N) (n = 41)	PERCENT OF RECORDS WITH WITH DRG CHANGE	PERCENT OF DISCREPANCIES (n = 64)
PRINCIPAL DIAGNOSIS	21	51.22	32.81
SEQUENCING DIAGNOSIS	3	7.32	4.69
C C OMITTED	9	21.95	14.06
ADDITIONAL OMITTED	5	12.16	7.81
UNSPECIFED	4	9.76	6.25
WRONG ADDITIONAL	7	17.07	10.94
OPTIONAL CODES	1	2.44	1.56
NO DOCUMENTATION	-	-	-
CLERICAL ERROR	-	-	-
TOTAL DIAGNOSIS DISCREPANCIES	n = 50	78.13 % OF TOTAL DISCREPANCIES	
PRINCIPAL PROCEDURE	1	2.44	1.56
PROCEDURE OMITTED	2	4.88	3.12
WRONG CODE	5	12.16	7.81
SEQUENCING PROCEDURE	-	-	-
CODED NOT DONE	-	-	-
NO DOCUMENTATION	6	14.63	9.38
TOTAL PROCEDURE DISCREPANCIES	n = 14	21.88 % OF TOTAL DISCREPANCIES	
TOTAL DISCREPANCIES	n = 64	*CC = COMPLICATION/COMORBIDITY	

and occurring in 21.95% of the records with DRG changes. Diagnosis sequencing was a problem in 7.32% of the changed records and was responsible for 4.69% of discrepancies found in the sample records.

Procedure code discrepancies on records with DRG changes were due primarily to lack of documentation for the procedure in 14.63% of these records, and accounted for 9.38% of the discrepancies in these records. The remainder of diagnostic and procedural discrepancies appear in Table 6.

DRG Reassignment Effect on Supply Resource Allocation

The next step in the evaluation process was to determine the effect of the abstracting and coding discrepancies which resulted in DRG reassignments on the RACH supply resource allocation. A relative case mix index (RCMI) was calculated based on the original 372 DRGs (See Appendix E). A second relative case mix index was calculated for the revised 372 DRGs which included the 41 reassigned DRGs (Appendix F). Both RCMIs were used in the DoD formula for calculating the supply resource allocation (See Figure 3).

The supply resource allocations based on the original and revised DRGs were $1,298,165.10 and $1,280,398.61 respectively. A $17,766.49 difference resulted from an overstatement due to erroneous IPDS data. The difference in potential supply resource allocation was not statistically significant.

FIG. 3

SUPPLY ALLOCATION CALCULATIONS

RELATIVE CASE MIX INDEX (RCMI) X DISPOSITIONS = INPATIENT WORK UNITS

INPATIENT WORK UNITS X RACH FINAL SUPPLY ALLOCATION INDEX X RACH FINAL SUPPLY ALLOCATION RATE = SUPPLY ALLOCATION

SUPPLY RESOURCE ALLOCATION BASED ON ORIGINAL DRG

RCMI X DISPOSITIONS X SUPPLY INDEX X SUPPLY RATE = SUPPLY ALLOCATIONS

0.9645 X 7,370 X .7492 X $ 243.76 = $ 1,298,165.10

SUPPLY RESOURCE ALLOCATION BASED ON REVISED DRG

RCMI X DISPOSITIONS X SUPPLY INDEX X SUPPLY RATE = SUPPLY ALLOCATIONS

0.9513 X 7,370 X .7492 X $ 243.76 = $ 1,280,398.61

SUPPLY RESOURCE ALLOCATION DIFFERENCE

$ 17,766.49

t (200) = .1760, P>.05, NS

A statistical evaluation of the sample RCMIs was conducted next. The mean RCMI was calculated for the original and revised samples. The null hypothesis was that there would be no statistically significant difference between the two means. The alternate hypothesis was that there would be a statistically significant difference between the two means. A *t* test conducted at the .05 alpha level failed to reject the null hypothesis $t(200) = .1760$, $p > .05$, N.S.

DRG Reassignment Effect on CHAMPUS Reimbursement

To further assess the financial impact of the abstracting and coding discrepancies which resulted in DRG reassignments, the researcher calculated the Civilian Health and Medical Program of the Uniformed Services (CHAMPUS) reimbursement for both data sets. Prospective payment rates of an Oklahoma for-profit, non-teaching, civilian hospital were used for this study (See Appendix G). CHAMPUS reimbursements based on the original DRGs were $95,853.89 and $80,087.56 for the revised DRGs. The $15,766.33 difference was due to an overstatement of reimbursement based on the eroneous IPDS data.

The next step in evaluating the effect of DRG reassignment on CHAMPUS reimbursement was a statistical evaluation of the potential IPDS and the potential revised DRG reimbursement was conducted. In doing so, the mean IPDS DRG reimbursement and the mean revised DRG reimbursement was determined. The null hypothesis was that there would be no statistically significant

difference between the two means. The alternate hypothesis was that there would be a statistically significant difference between the two means. A $\underline{t}$ test conducted at the .05 alpha level failed to reject the null hypothesis $\underline{t}$ (80) = 1.2028, $p > .05$, N.S.

CHAMPUS potential reimbursements allowed the researcher to view individual cases and assign monetary values to each DRG. DRG changes due to a discrepancy in the principal diagnosis showed a reimbursement range from an understatement of $1,960.18 to an overstatement of $2,200.44 (Appendix G). Twelve of the 21 DRGs were overstated and 9 were understated, as was determined by the RACH medical records data.

DRG changes resulting from a discrepancy due to complications or comorbid conditions showed a reimbursement range of an understatement of $2,327.55 to an overstatement of $2,030.36. Seven of the 9 DRGs were understated while only 2 were overstated; demonstrating the potential effect of omitting complications and/or comorbid conditions. One DRG change with both a principal diagnosis and complication/comorbid condition resulted in a $1,960.18 overstatement. The net effect on reimbursement due to ommission of complications and/or comorbid coditions was $305.06 (See Appendix H).

The overall effect on resource allocation (reimbursement) was not statistically significant in this study. The researcher, however, suggest that the prudent health care administrator should not base decisions on data which indicates a 19.69% error in reimbursement (based on CHAMPUS figures). The prudent administrator should use the data as a guide to work with the

Medical Records Department Supervisor to identify and solve problems that have a financial impact on his hospital.

CHAPTER III

CONCLUSION, RECOMMENDATIONS, and FINAL COMMENTS

Conclusion

Answer to the Research Problem

Based on the results of this research and the established criteria, it was determined that the RACH abstracted and coded medical records data is not reliable for DRG assignment. DRG assignments resulting from the RACH medical records data do not significantly affect RACH supply resource allocation based on a DRG RAM.

Data Reliability at RACH

The results of this study confirmed the need for an in depth assessment of the medical records department in preparation for a PPS. The overall and specific percentage of coder discrepancy is greater than acceptable for reliable data. The rates are however, very similar to those reported in the literature prior to implementation of the PPS, PPS education programs, and medical records department revisions in the civilian health care sector.

DRG assignment discrepancy rates were demonstrated to be excessive in this study. In the civilian community a DRG change rate greater than 5% gives cause for a 100% record review by the

PRO (William, Jim). Although DoD medical records data has not been critically questioned to this point, inappropriate DRG assignment speaks poorly for data quality.

Due to the generally healthy patient admitted for the treatment of a specific problem, the potential for an even higher DRG reassignment rate was averted at RACH. It was noted in this study that complex cases with multiple diagnoses showed more coding discrepancies and therefore the potential for more DRG reassignments. The study also showed inconsistent coding among RACH coders in the sample records, such as in cases where the patient was admitted for chest pain.

The general use of higher weighted (paying) DRGs may be interpreted as DRG Creep, but the researcher concluded that incomplete record abstracting may be the cause. Medical records with multiple diagnoses were coded in the same sequence as the physician had written them, resulting in the assignment of the wrong principal diagnosis in some cases. In some cases, chart documentation was found which supported complications or comorbidity, another indication of incomplete abstracting of the record. If questions exist as a result of abstracting the record, it is imperative that the coder communicate with the physician for clarification.

The increasingly important role of hospital medical records professionals in hospitals underlies the need for accurate data. In addition to the financial impact of medical records data, accuracy is required for research and for medical and administrative decisions.

Recommendations

To improve medical records data quality and reliability at RACH, the following recommendations were made:

1. The commander should formation of a DRG Implementation Committee. The HSC DRG Implementation Working Group suggests DRG committee membership include the Deputy Commander Clinical Services. Patient Administrator, Chief Nurse, Medical Records Supervisor, Resource Manager and Information Management Officer (Triservice 12).

2. A RACH medical records quality assurance program should be developed, implemented and revised as needed. The QA program should define quality, set standards and evaluate attainment of departmental standards. Through the QA plan institutional, departmental and practitioner problems which impact on medical records data quality will be identified.

3. Focused studies which address many issues of data quality, to include abstracting, coding, data availability (i.e. physician documentation in the medical record), and other issues be conducted routinely.

4. An aggressive continuing education program for coders must be developed. The program should be projected several months to one year in advance, and include RACH inservices, DoD programs, and civilian sponsored continuing education programs. A closer association with the Veterans Administration Hospital (VA) may also prove beneficial, as the VA has a medical records QA plan and has dealt with DRGs for several years.

5. Develop a DRG staff education plan with specific emphasis on physician education. Education of the medical staff is important. Physicians are unfamiliar with stating principal diagnosis in a reimbursement environment. Physicians tend to lean toward their specialty, and frequently omit complications and comorbidities which may impact negatively on reimbursement.

6. The RACH Utilization Review Coordinator (URC) position should be filled by someone with a strong background in medical records and the PPS. The URC can assist the DRG Implementation committee a great deal, since much of the data for utilization review studies are generated by the medical record or in the Patient Administration Division.

7. RACH should continue efforts to acquire, in a timely manner, tools which have proven effective in increasing data quality. A reduction in medical records abstracting and coding errors is possible with automated encoders, and GROUPER software. Options which include leasing equipment or acting as a DoD hardware and software test site should be explored.

8. The RACH command group should monitor efforts and provide input into the upgrading of medical records staff which would encourage ARTs and RRAs to work for the MTF.

9. RACH should suggest a broader use of the abstracted and coded data retrieved from the MTF's medical records by the Forensic Medical Advisory Service Inc. If the coded data was made available to the MTF medical records staff, the reabstracted and recoded data would provide an independent set of data. It would be a mechanism to assess errors which occur within the

department and which would not be picked up by interrater reliability studies within the department.

10. RACH should pursue affiliation with ART and RRA programs to offer clinical experience for students, thereby exposing students to MTFs, and potential employment.

11. The HSC Error Audit criteria should be refined, making the criteria more discriminate and able to ascertain coding errors relevant to DRG Assignment.

Final Comments

The phenomenal impact of the Medicare Prospective Payment System on the American health care system is still being felt several years after its implementation. Civilian hospitals responded in a manner which positioned them for survival under the system which completely changed the incentives and rules for financial health. Of high priority in their survival tactics was a thorough evaluation of their medical records departments. Medical record departments became more important since optimum reimbursement depended on accurate medical records data.

Research has demonstrated that the data on which DRGs are assigned and hospitals are reimbursed, have high error rates. Error rates can, in many cases, inaccurately represent the hospital's case mix and result in major financial losses. On the other hand, there is a potential to gain financially as a result of erroneous data, in the form of DRG creep. It became clear to

civilian institutions that their medical records data must be as accurate as possible for both internal and external purposes.

To set a goal of error-free data is unrealistic and in many cases unnecessary. Consideration must be given to the use of the data and the implications of erroneous decisions based on erroneous data. When reimbursement is based on accurate diagnostic and procedural data, the error tolerance is "very low" (Kloss and Woodbury 35).

As the MHSS embarks upon a DRG based RAM, it is imperative that lessons learned by the civilian community in dealing with PPS be heeded. Each MTF must assess their medical records department. Survival under a PPS is unlikely without such an assessment and corrective action must be taken as needed. A major factor in the assessment of medical records departments is the reliability of medical records data.

There is a lack of published data which addresses the accuracy of DoD and/or MTF-level medical records data. As a result, the impact of inaccurate data on DRG assignment and resource allocation has not been addressed. It is hoped that this study has provided information which will assist in assessing and improving the reliability of medical records data at RACH. This study may also generate interest in a larger data quality study at the HSC level. Conducting this study during this period is timely and has the potential to impact positively when most needed.

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Appendix A

Definitions

DEFINITIONS

Abstract - Summary of a patient's medical data which provides a basis for classifying the patient according to treatment, diagnosis, age, discharge status or any of an extensive number of patient attributes.

Ambulatory Work Unit (AWU) - An outpatient workload credit measurement. AWU weights and methodology are published in Report HR 88-001 (April 1988), "Military health Services System Ambulatory Work Unit" which may be obtained from Defense Technical Information Center or National Technical Information Service.

Average Length-of-Stay (ALOS) - The average length of hospitalization of inpatients discharged during the period under consideration.

Case-Mix - the diagnosis-specific makeup of a health program's workload. Case-mix directly influenced by the length-of-stay, intensity, cost and scope of the services provided by a hospital or other health program.

Case-Mix Index (CMI) - total Relative Weighted Products (RWPs) for a medical treatment facility (or other level of accumulation) divided by the total of biometrics dispositions for which the RWPs were determined. CMI includes short and long stay outliers. DRG 469 (Primary diagnosis invalid as a discharge diagnosis) and DRG 470 (Ungroupable) are excluded from the calculations since their

relative weights are zero. The CMI gives average RWPs per disposition.

Comorbidity - a pre-existing condition which will, because of its presence with a specific principal diagnosis, cause an increase in length of stay by at least one day in approximately 75% of the cases. Also referred to as "substantial comorbidity".

Complication - a condition that arises during the hospital stay that prolongs the length of stay by at least one day in approximately 75% of cases. Also referred to as "substantial complication."

DoD CMI (FY85) - average RWPs per disposition across DoD for FY 85. Total DoD RWPs for the base year (FY 85) were 776,023. Total dispositions from biometrics data (less DRGs 469 and 470) were 957,901. The DoD CMI for the base year is then equal to 776,023/957,901 or 0.8101. This factor is used to adjust all subsequent case-mix calculations to the DoD average for the base year.

Diagnosis Related Groups (DRGs) - an inpatient classification scheme which categorizes patients who are medically related with respect to diagnosis and treatment, and who are statistically similar in their lengths of stay. Diagnosis Related Groups (DRG) Weight is an index number which reflects the relative resource consumption associated with each DRG. (Note 1)

Discharge (Disposition) - the termination of a period of

inpatient hospitalization through the formal release of the inpatient by the hospital. An indication of the patient for further use upon discharge.

Encoder - computer software program which selects diagnostic codes and offers the coder greater accuracy and ease of use than a manual coding system.

GROUPER - computer software program sponsored by HCFA which is used to assign discharges to appropriate DRGs using the following information: patient's age, sex, principal diagnosis, principal procedures performed, and discharge status.

Health Care Financing Administration (HCFA) - the federal agency within the Department of Health and Human Services that is responsible for administering the Medicare program.

Inpatient Work Units (IWUs) - the workload credit given each MTF disposition. Total ISUs for an MTF are calculated by multiplying the MTF's total MEPRS dispositions by their RCMI. Since there is often a discrepancy between biometrics and MEPRS dispositions, the official volume count from MEPRS is used. This process makes the assumption that any dispositions counted in MEPRS but not available through biometrics for DRG assignment, follow the same case-mix distribution as those dispositions assigned to DRGs.

Maximization - the intentional manipulation of data to optimize hospital reimbursement.

Medical Work Unit (MWU) - the total DRG-based workload credit for an MTF. Formula: MWU = Total IWU + Total AWU.

Outliers (Atypical Cases) - cases which have an extremely long or short length-of-stay (day outliers) when compared to most discharges classified in the same DRG.

Peer Groups - Groupings of medical treatment facilities who exhibit similar attributes of bed size and case-mix complexity in the case of hospitals or similarity in location, size, and outpatient service complexity in the case of clinics.

Primary Diagnosis - the diagnosis of the condition whose treatment resulted in the greatest resource consumption during the period in which the patient was hospitalized.

Principal Diagnosis - the condition chiefly responsible for the admission of the patient to the hospital for care.

Principal Procedure - that procedure most related to the principal diagnosis and which was performed for definitive treatment, rather than performed for diagnostic or exploratory or necessary to treat a complication.

Reimbursement, Cost-based - the amount of the payment based on the costs to the provider of delivering the service. The actual payment may be based on any one of several different formulas, such as full cost, full cost plus an additional percentage, allowable costs, or a fraction of costs.

Reimbursement, Prospective - a payment method in which hospital rates are set prospectively - before services are rendered, and are based upon expected classes and volumes of patients.

Relative Case-Mix Index (RCMI) - the MTF CMI divided by the FY 85 DoD CMI. This calculation standardizes workload

credit such that the average discharge across all of DoD receives a workload credit of 1.00. For a given MTF, A RCMI of 1.35 would indicate that based on a case-mix alone, that MTF's disposition should be 35% more resource intense than the DoD average, everything else being equal.

Relative Weighted Products (RWP) - dispositions from biometrics weighted by CHAMPUS DRG relative weights. Each disposition from the Services' biometrics systems is assigned to a DRG and weighted by the appropriate CHAMPUS weight for that DRG in accordance with the rules for workload credit. The sum of weighted dispositions for a clinical service, medical treatment facility, major command, etc., is the total RWPs for that level of accumulation.

Trim Points - the length-of-stay or cost cutoff points that separate patients with unusually long or short lengths-of-stay or unusually high costs from "normal" cases within each DRG. Patients who exceed these cutoff or "trim" points are classified as outliers and eligible for additional workload credit.

Note 1: Definition from page 39768 of the September 1, 1983 Federal Register, 48 (171).

APPENDIX B

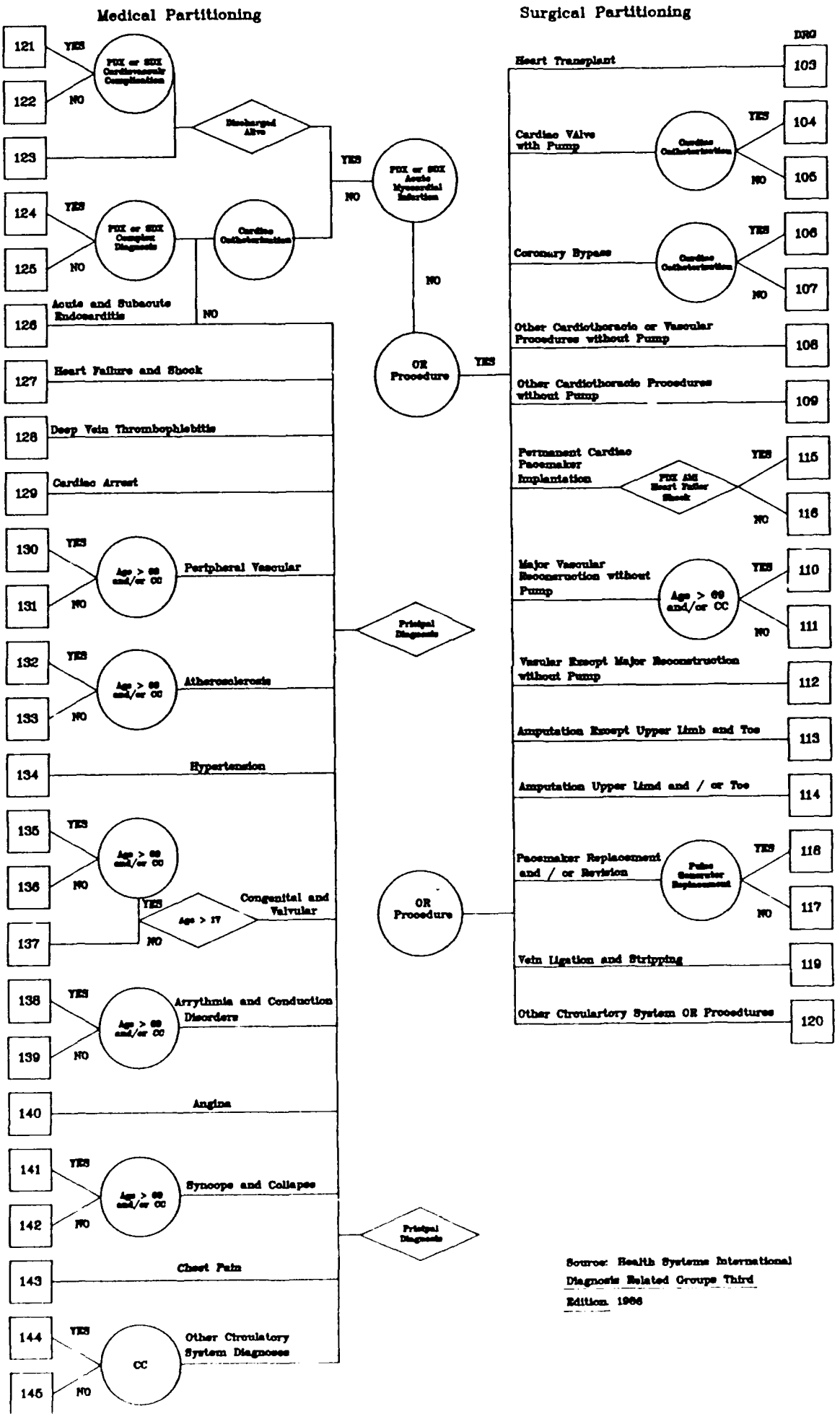
EXAMPLES OF GROUPER LOGIC, DRG REASSIGNMENT, AND REIMBURSEMENT

DRG REASSIGNMENT DUE TO OMISSION OF COMPLICATIONS

IPDS (RACH) DATA	REVISED DATA
DIAGNOSIS: Acute Myocardial Infarction, Inferior Wall	DIAGNOSIS: Acute Myocardial Infarction, Inferior Wall
MDC 5 Diseases and disorders of the Circulatory System	MDC 5 Diseases and Disorders of the Circulatory System
OR Procedure YES NO	OR Procedure YES NO
DIAGNOSES: Principal: Acute Myocardial Infarction, Inferior Wall	DIAGNOSES: Principal: Acute Myocardial Infarction, Inferior Wall
Secondary: None	Secondary: * Hypotension * Postmyocardial Infarction Syndrome * Coronary Vasodilators Causing Adverse Effects In Theraputic Use
Discharge Status - Home	Discharge Status - Home
DRG # 122 Payment-$3,830.87	DRG # 121 Payment-$5,519.27

Payment Difference $1,688.40

* Complications: Patient returned to the ICU due to Post MI Syndrome and Hypotention secondary to NTG.



Source: Health Systems International Diagnosis Related Groups Third Edition 1986

DRG REASSIGNMENT DUE TO LACK OF DOCUMENTATION

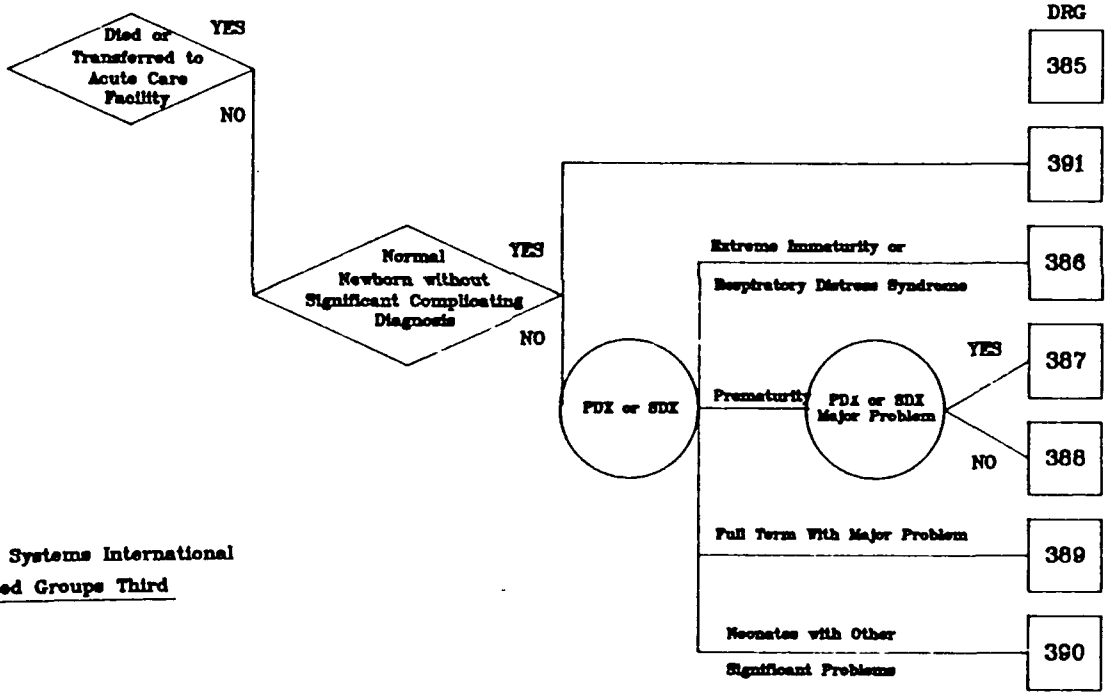
IPDS (RACH) DATA	REVISED DATA
DIAGNOSIS:Twin Birth, Mate Live Born In Hospital	DIAGNOSIS: TWIN BIRTH, MATE LIVE Born In Hospital
MDC 15 Newborns and Other Neonates With Conditions Originating in the Perinatal Period	MDC 15 Newborns and Other Neonates With Conditions Originating in the Perinatal Period
OR Procedure YES NO	OR Procedure YES NO
DIAGNOSES: Principal: Twin Birth, Mate Live Born in Hospital	DIAGNOSES: Principal: Twin Birth, Mate Live Born in Hospital
Secondary: Fetal Blood Loss Compression of umbilical Cord Affecting Newborn Volume Depletion Congenital Anemia Neonatal Hypoglycemia *Disorders Relating to Preterm Infants	Fetal Blood Loss Compression of umbilical Cord Affecting Newborn Volume Depletion Congenital Anemia Neonatal Hypoglycemia
PROCEDURES: Principal: Oxygen Enrichment	Principal: Oxygen Enrichment
Secondary: Transfusion of Packed Cells	Secondary: Transfusion of Packed Cells
Discharge Status - Home	Discharge Status - Home
DRG # 387	DRG # 389
Payment - $4,318.50	$1,277.30

Payment Difference $3,041.20

* Discrepency due to lack of documentation for prematurity, infant 38 weeks gestation.

MAJOR DIAGNOSTIC CATEGORY 15

Medical and Surgical Partitioning



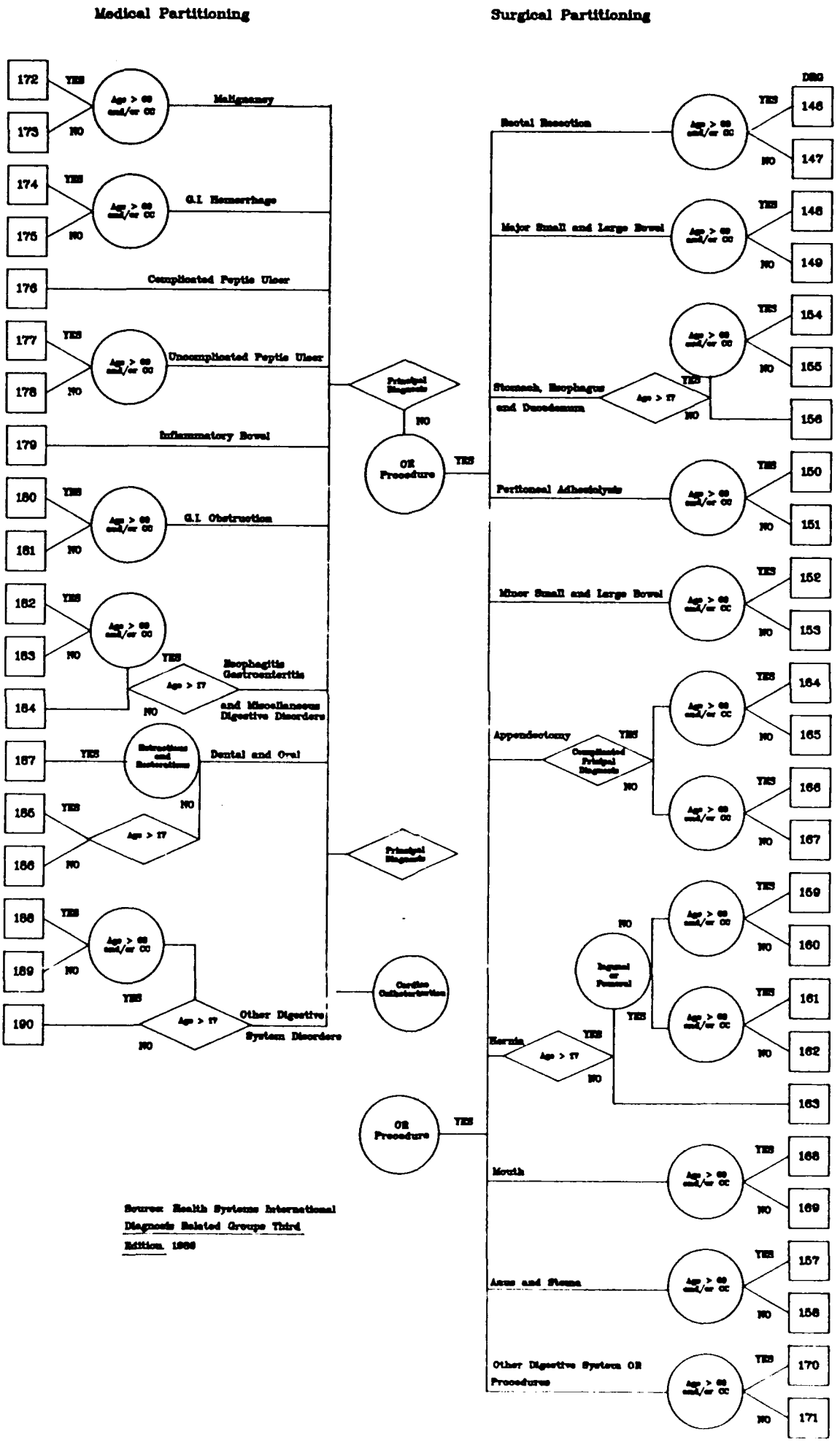
Source: Health Systems International Diagnosis Related Groups Third Edition. 1986

DRG REASSIGNMENT DUE TO
OMISSION OF COMPLICATION

IPDS (RACH) DATA	REVISED DATA
DIAGNOSIS: Disturbances In Tooth Eruption	DIAGNOSIS: Disturbances In Tooth Eruption
MDC 6 Diseases and Disorders of the Digestive System	MDC 6 Diseases and Disorders of the Digestive System
OR Procedure YES NO	OR Procedure YES NO
DIAGNOSES: Principal: Disturbances In Tooth Eruption	Disturbances In Tooth Eruption
Secondary: Benign Neoplasm Of Lower Jaw Bone	Secondary:* Accidental Puncture or Laceration During a Procedure Benign Neoplasm of Lower Jaw Bone
PROCEDURES: Principal: Surgical Extraction of Tooth Secondary: Excision Of Dental Lesion of Jaw	PROCEDURES: Principal: Excision of Dental Lesion of Jaw Secondary: Suture of Cranial and Peripheral Nerves
Discharge Status - Home	Discharge Status - Home
DRG #169 Payment-$2,365.19	DRG# 168 Payment-$4,692.74

Payment Difference $2,327.55

* Complication which was omitted.



Source: Health Systems International Diagnosis Related Groups Third Edition, 1986

APPENDIX C

MEDICAL RECORDS ANALYSIS FORM

MEDICAL RECORD ANALYSIS FORM

ERROR

Y/N

REGISTER # _____

SS# _____

ADMISSION DATE _____

DISCHARGE DATE _____ DISCHARGE STATUS _____

AGE/BD _____

SEX _____

	IPDS CODES		REABSTRACTED CODES	REASON FOR DISCREPANCY
PRIN. DX 1:		\		---PRINCIPAL DX
DX 2:		\		---COMORBID/COMPLICATION
DX 3:		\		OMITTED
DX 4:		\		---UNSPECIFIED/NON
DX 5:		\		SPECIFIC CODE
PRIN. PRO 1:		\		---DISP.CODE ERROR
PRO 2:		\		---MILITARY UNIQUE CODE
PRO 3:		\		---WRONG ADDL. DX.
PRO 4:		\		---NO DOCUMENTATION
PRO 5:		\		---PROCEDURE
				OMITTED
				---CLERICAL ERROR
				---OTHER

IPDS DRG _____ \ Revised DRG _____

DRG WT.	DRG WT.	DRG WT. VARIANCE

COMMENTS:

APPENDIX D

SAMPLE DISCREPANCY SHEET

SAMPLE DISCREPANCIES SHEET

TOTAL														
														RECORD NUMBER
														PRINCIPAL DIAGNOSIS
														SEQUENCING
														CC OMITTED
														ADDITIONAL OMITTED
														UNSPECIFIED NON-SPECIFIC
														WRONG ADDITIONAL
														OPTIONAL CODE
														NO DOCUMENTATION
														CLERICAL ERROR
														PRINCIPLE PROCEDURE
														PROCEDURE OMITTED
														WRONG CODE
														CLERICAL ERROR
														CODED NOT DONE
														OPTIONAL CODES
														MILITARY UNIQUE
														JUDGMENT
														MILITARY UNIQUE ONLY
														JUDGMENT ONLY
														OPTIONAL ONLY
														DRG CHANGE

DIAGNOSIS DISCREPANCIES

PROCEDURE DISCREPANCIES

APPENDIX E

ORIGINAL CASE MIX INDEX (CMI) CALCULATIONS

ORIGINAL CMI CALCULATIONS

CASE CMI	CASE CMI	CASE CMI	CASE CMI	SUM OF CASE-CMI	SAMPLE CMI	SAMPLE RCMI
0.7556	0.4666	0.4666	0.5574	2.2462	0.0060	0.0073
0.4863	0.7574	0.9350	0.4254	2.6041	0.0070	0.0085
0.7518	0.7574	0.1688	0.5359	2.2139	0.0060	0.0073
0.5024	0.9350	0.6665	1.3593	3.4632	0.0093	0.0113
2.4151	0.3560	0.6849	0.8232	4.2792	0.0115	0.0139
0.4666	0.6524	0.4732	0.9528	2.5450	0.0068	0.0082
0.1390	0.3560	0.8753	0.5417	1.9120	0.0051	0.0062
0.4666	0.5023	0.9528	0.4627	2.3844	0.0064	0.0078
0.5024	1.7318	0.7116	0.8475	3.7933	0.0102	0.0124
0.4666	0.5316	0.4817	2.3866	3.8665	0.0104	0.0126
0.6394	0.4641	0.4817	0.5574	2.1426	0.0058	0.0070
0.7876	0.5402	0.1390	0.6394	2.1062	0.0057	0.0069
1.0060	0.1390	3.2655	0.9303	5.3408	0.0144	0.0175
1.1151	0.4666	0.4817	0.4817	2.5451	0.0068	0.0082
0.4817	0.1390	0.1390	0.5574	1.3171	0.0035	0.0042
0.8425	1.1017	0.4666	0.4118	2.8226	0.0076	0.0092
0.6042	0.7451	0.1390	0.4340	1.9223	0.0052	0.0063
0.5574	0.5574	1.8601	0.8997	3.8746	0.0104	0.0126
0.3214	0.7425	1.2663	0.1390	2.4692	0.0066	0.0080
0.3560	1.3881	0.4817	3.4654	5.6912	0.0153	0.0185
0.3560	0.8099	0.1390	0.3560	1.6609	0.0045	0.0055
0.4673	0.9704	0.5673	0.4817	2.4867	0.0067	0.0081
0.5359	0.8014	0.7556	0.4817	2.5746	0.0069	0.0084
0.5024	0.5359	0.8102	1.3881	3.2366	0.0087	0.0105
0.8138	0.3600	0.9528	0.7518	2.8784	0.0077	0.0093
0.9012	0.4863	0.7497	0.4817	2.6189	0.0070	0.0085
0.4016	0.6606	0.1390	0.5574	1.7586	0.0047	0.0057
1.3593	0.5773	3.1655	0.2792	5.3813	0.0145	0.0176
0.8014	0.4016	0.4817	0.5359	2.2206	0.0060	0.0073
0.8014	0.4942	1.2247	0.3332	2.8535	0.0077	0.0093
0.7497	0.1390	0.5788	0.5417	2.0092	0.0054	0.0065
0.8122	0.8102	0.3860	0.6263	2.6347	0.0071	0.0086
1.2098	1.5437	0.4016	0.6514	3.8065	0.0102	0.0124
1.5484	0.6998	0.4942	0.1390	2.8814	0.0077	0.0093
2.7904	0.9241	0.9350	0.4666	5.1161	0.0138	0.0167
0.2257	0.4817	0.1390	1.0255	1.8719	0.0050	0.0061
0.5760	0.6393	0.6998	0.7556	2.6707	0.0072	0.0087
0.9012	0.4817	0.4666	1.0702	2.9197	0.0078	0.0095
0.4627	0.4673	0.1390	0.7425	1.8115	0.0049	0.0059
0.9817	0.1390	0.4118	0.4925	2.0250	0.0054	0.0065
0.9045	0.4817	0.8102	0.6648	2.8612	0.0077	0.0093
0.9396	0.4666	0.8835	0.6394	2.9291	0.0079	0.0096
0.2257	1.9807	0.4942	0.4118	3.1124	0.0084	0.0102
3.4654	0.1390	0.9396	0.1390	4.6830	0.0126	0.0153
0.5574	0.3615	0.7556	0.4666	2.1411	0.0058	0.0070
0.4627	0.8102	0.1390	0.4817	1.8936	0.0051	0.0062
0.4817	0.3615	0.4016	0.5359	1.7807	0.0048	0.0058

ORIGINAL CMI CALCULATIONS

CASE CMI	CASE CMI	CASE CMI	CASE CMI	SUM OF CASE-CMI	SAMPLE CMI	SAMPLE RCMI
0.1390	0.4817	0.4666	0.8753	1.9626	0.0053	0.0064
1.1636	1.0876	0.4817	1.0660	3.7989	0.0102	0.0124
2.2800	0.5574	1.1131	4.4754	8.4259	0.0227	0.0275
0.8102	1.5068	4.5787	0.4673	7.3630	0.0198	0.0240
0.4732	0.1390	0.3600	0.5024	1.4746	0.0040	0.0048
0.5359	0.4016	1.5646	0.8053	3.3074	0.0089	0.0108
0.4917	0.4016	2.7049	0.9012	4.4994	0.0121	0.0147
0.5024	0.5277	0.6261	0.5982	2.2544	0.0061	0.0074
0.4016	0.4666	0.4817	0.4016	1.7515	0.0047	0.0057
0.4666	0.4817	0.9826	0.5024	2.4333	0.0065	0.0079
0.1390	0.5574	1.3703	0.4666	2.5333	0.0068	0.0082
0.5497	0.4817	1.0370	0.7994	2.8678	0.0077	0.0093
0.1390	0.1390	0.4662	0.4502	1.1944	0.0032	0.0039
0.8102	0.7520	0.5574	0.7497	2.8693	0.0077	0.0093
3.0656	0.6730	0.7425	0.5574	5.0385	0.0135	0.0164
1.0308	0.6461	0.4746	0.1390	2.2905	0.0062	0.0075
0.6039	0.3483	0.8608	0.6684	2.4814	0.0067	0.0081
0.6514	0.8685	0.3583	0.6849	2.5631	0.0069	0.0084
0.6263	3.3194	0.3357	0.4817	4.7631	0.0128	0.0155
0.8425	0.6455	0.4942		1.9822	0.0053	0.0064
0.4817	0.9012	1.0770		2.4599	0.0066	0.0080
0.7425	0.4627	0.4817		1.6869	0.0045	0.0055
0.4817	0.4817	0.7518		1.7152	0.0046	0.0056
0.1390	0.1390	1.1275		1.4055	0.0038	0.0046
3.1655	1.0878	0.6021		4.8554	0.0131	0.0159
0.9364	0.4817	0.1390		1.5571	0.0042	0.0051
0.1390	0.3938	0.4666		0.9994	0.0027	0.0033
1.0878	0.3938	0.5574		2.0390	0.0055	0.0067
0.4817	0.3938	0.4817		1.3572	0.0036	0.0044
0.4817	0.6524	1.1876		2.3217	0.0062	0.0075
0.4817	0.5024	1.6986		2.6827	0.0072	0.0087
0.7497	4.1218	1.6986		6.5701	0.0177	0.0214
0.3429	0.4458	0.4817		1.2704	0.0034	0.0041
0.4666	0.7497	0.4666		1.6829	0.0045	0.0055
0.1390	0.1390	0.8290		1.1070	0.0030	0.0036
1.7039	0.3214	4.2548		6.2801	0.0169	0.0205
1.0255	0.5359	0.6852		2.2466	0.0060	0.0073
0.8425	1.8601	1.0272		3.7298	0.0100	0.0121
0.3297	0.4304	0.8099		1.5700	0.0042	0.0051
0.5421	0.4817	0.8099		1.8337	0.0049	0.0059
0.8475	0.1390	3.2976		4.2841	0.0115	0.0139
4.6574	0.3615	4.5787		9.5976	0.0258	0.0313
0.3709	0.4666	0.9350		1.7725	0.0048	0.0058
0.7556	0.4817	4.4302		5.6675	0.0152	0.0184
1.2739	1.7263	0.3214		3.3216	0.0089	0.0108
0.4130	0.7745	0.1390		1.3265	0.0036	0.0044
0.5024	1.3820	0.4817		2.3661	0.0064	0.0078

ORIGINAL CMI CALCULATIONS

CASE CMI	CASE CMI	CASE CMI	CASE CMI	SUM OF CASE-CMI	SAMPLE CMI	SAMPLE RCMI
3.1655	0.1390	0.4666		3.7711	0.0101	0.0122
0.1390	0.3597	3.4536		3.9523	0.0106	0.0128
0.5359	0.3560	0.4817		1.3736	0.0037	0.0045
0.4666	0.4666	2.0912		3.0244	0.0081	0.0098
0.4817	0.9303	0.4817		1.8937	0.0051	0.0062
0.4817	0.8425	0.4817		1.8059	0.0049	0.0059
0.2257	0.4863	0.2257		0.9377	0.0025	0.0030
0.3597	0.1390	0.9012		1.3999	0.0038	0.0046
83.0585	68.8645	95.6559	48.4982	296.0771	0.7959	0.9645

APPENDIX F

REVISED CASE MIX INDEX (CMI)

CALCULATIONS

REVISED CMI CALCULATIONS

CASE CMI	CASE CMI	CASE CMI	CASE CMI	SUM OF CASE-CMI	SAMPLE CMI	SAMPLE RCMI
0.7556	0.4666	0.4666	0.5574	2.2462	0.0060	0.0073
0.4863	0.7574	0.9350	0.4254	2.6041	0.0070	0.0085
0.7518	0.7574	0.1688	0.5359	2.2139	0.0060	0.0073
0.5024	0.9350	0.6665	1.3593	3.4632	0.0093	0.0113
2.4151	0.3560	0.6849	0.8232	4.2792	0.0115	0.0139
0.4666	0.6524	0.4732	0.9528	2.5450	0.0068	0.0082
0.1390	0.3560	0.8753	0.5417	1.9120	0.0051	0.0062
0.4666	0.5023	0.6524	0.4627	2.0840	0.0056	0.0068
0.5024	1.7318	0.7116	0.8475	3.7933	0.0102	0.0124
0.4666	0.5316	0.4817	2.3866	3.8665	0.0104	0.0126
0.6432	0.4641	0.4817	0.5574	2.1464	0.0058	0.0070
0.7876	0.5402	0.1390	0.6394	2.1062	0.0057	0.0069
1.0060	0.1390	3.2655	1.8458	6.2563	0.0168	0.0204
1.1151	0.4666	0.4817	0.4817	2.5451	0.0068	0.0082
0.4817	0.1390	0.1390	0.5574	1.3171	0.0035	0.0042
0.8425	1.1017	0.4666	0.4118	2.8226	0.0076	0.0092
0.6042	0.6498	0.1390	0.4340	1.8270	0.0049	0.0059
0.5574	0.5574	1.8601	0.8997	3.8746	0.0104	0.0126
0.3214	0.7425	1.2663	0.2257	2.5559	0.0069	0.0084
0.3560	0.5968	0.4817	3.4654	4.8999	0.0132	0.0160
0.3560	0.8099	0.1390	0.3560	1.6609	0.0045	0.0055
0.4673	0.3429	0.5673	0.4817	1.8592	0.0050	0.0061
0.5359	0.8014	0.7556	0.4817	2.5746	0.0069	0.0084
0.5024	0.5359	0.8102	0.4340	2.2825	0.0061	0.0074
0.8138	0.3600	0.9528	0.7518	2.8784	0.0077	0.0093
0.9012	0.4863	0.7497	0.4817	2.6189	0.0070	0.0085
0.4016	0.7236	0.1390	0.5574	1.8216	0.0049	0.0059
1.1797	0.5773	3.1655	0.2792	5.2017	0.0140	0.0170
0.8014	0.4016	0.4817	0.5359	2.2206	0.0060	0.0073
0.8014	0.4942	1.2247	0.3332	2.8535	0.0077	0.0093
0.5574	0.1390	0.5788	0.5417	1.8169	0.0049	0.0059
0.8122	0.8102	0.3860	0.6263	2.6347	0.0071	0.0086
1.2098	0.7451	0.4016	0.6514	3.0079	0.0081	0.0098
1.5484	0.6998	0.4942	0.2257	2.9681	0.0080	0.0097
3.5614	0.9241	0.9350	0.4666	5.8871	0.0158	0.0191
0.2257	0.4817	0.1390	1.0255	1.8719	0.0050	0.0061
0.5760	0.6393	0.6998	0.7556	2.6707	0.0072	0.0087
0.9012	0.4817	0.4666	0.8099	2.6594	0.0071	0.0086
0.4627	0.4673	0.1390	0.7425	1.8115	0.0049	0.0059
0.9817	0.1390	0.4118	0.4925	2.0250	0.0054	0.0065
0.9045	0.4817	0.8102	0.6875	2.8839	0.0078	0.0095
0.9396	0.4666	0.7461	0.6394	2.7917	0.0075	0.0091
0.2257	1.9807	0.4942	0.4118	3.1124	0.0084	0.0102
3.4654	0.1390	0.9396	0.1390	4.6830	0.0126	0.0153
0.5574	0.3615	0.7556	0.4666	2.1411	0.0058	0.0070
0.4627	0.4666	0.1390	0.4817	1.5500	0.0042	0.0051
0.4817	0.3615	0.4016	0.5359	1.7807	0.0048	0.0058

REVISED CMI CALCULATIONS

CASE CMI	CASE CMI	CASE CMI	CASE CMI	SUM OF CASE-CMI	SAMPLE CMI	SAMPLE RCMI
0.1390	0.4817	0.4666	0.8753	1.9626	0.0053	0.0064
1.1636	1.0876	0.4817	1.0660	3.7989	0.0102	0.0124
2.2800	0.5574	1.1131	4.4754	8.4259	0.0227	0.0275
0.4666	2.1709	4.5787	0.4673	7.6835	0.0207	0.0251
0.4732	0.1390	0.3600	0.5024	1.4746	0.0040	0.0048
0.5359	0.5031	1.5646	0.8053	3.4089	0.0092	0.0111
0.4917	0.4016	2.7049	0.9012	4.4994	0.0121	0.0147
0.5024	0.5277	0.6261	0.6808	2.3370	0.0063	0.0076
0.4016	0.4666	0.4817	0.4016	1.7515	0.0047	0.0057
0.4666	0.4817	0.9826	0.8322	2.7631	0.0074	0.0090
0.1390	0.5574	1.3703	0.4666	2.5333	0.0068	0.0082
0.5497	0.4817	1.0370	0.7994	2.8678	0.0077	0.0093
0.1390	0.1390	0.4662	0.4502	1.1944	0.0032	0.0039
0.8102	0.7520	0.5574	0.7497	2.8693	0.0077	0.0093
3.0656	0.6730	0.7425	0.5574	5.0385	0.0135	0.0164
0.7452	0.6461	0.7451	0.1390	2.2754	0.0061	0.0074
0.6039	0.3483	0.8608	0.6684	2.4814	0.0067	0.0081
0.6514	0.8685	0.3583	0.6849	2.5631	0.0069	0.0084
0.7029	3.3194	0.3357	0.4817	4.8397	0.0130	0.0158
0.8425	0.6455	0.4942		1.9822	0.0053	0.0064
0.4817	0.9012	1.0770		2.4599	0.0066	0.0080
0.7425	0.4627	0.4817		1.6869	0.0045	0.0055
0.8014	0.4817	0.7153		1.9984	0.0054	0.0065
0.1390	0.1390	1.1275		1.4055	0.0038	0.0046
3.1655	1.0878	0.6021		4.8554	0.0131	0.0159
0.9364	0.4817	0.1390		1.5571	0.0042	0.0051
0.1390	0.3938	0.4666		0.9994	0.0027	0.0033
1.0878	0.3938	0.5574		2.0390	0.0055	0.0067
0.4817	0.3938	0.4817		1.3572	0.0036	0.0044
0.4817	0.9528	0.7452		2.1797	0.0059	0.0071
0.4817	0.5024	0.5024		1.4865	0.0040	0.0048
0.7497	4.1218	0.5024		5.3739	0.0144	0.0175
0.3429	0.4913	0.4817		1.3159	0.0035	0.0042
0.4666	0.7497	0.4666		1.6829	0.0045	0.0055
0.1390	0.1390	0.8290		1.1070	0.0030	0.0036
1.7039	0.3560	4.2548		6.3147	0.0170	0.0206
1.0255	0.5359	0.6852		2.2466	0.0060	0.0073
0.8425	1.8601	1.0272		3.7298	0.0100	0.0121
0.3297	0.4304	0.8099		1.5700	0.0042	0.0051
0.8475	0.8608	0.8099		2.5182	0.0068	0.0082
0.8475	0.1390	3.2976		4.2841	0.0115	0.0139
6.1884	0.3615	4.5787		11.1286	0.0299	0.0362
0.3709	0.4666	0.9350		1.7725	0.0048	0.0058
0.7556	0.4817	4.4302		5.6675	0.0152	0.0184
1.2739	0.8608	0.3214		2.4561	0.0066	0.0080
0.7425	0.7745	0.1390		1.6560	0.0045	0.0055
0.2257	1.3820	0.4817		2.0894	0.0056	0.0068

REVISED CMI CALCULATIONS

CASE CMI	CASE CMI	CASE CMI	CASE CMI	SUM OF CASE-CMI	SAMPLE CMI	SAMPLE RCMI
3.1655	0.1390	0.4666		3.7711	0.0101	0.0122
0.1390	0.3597	3.4536		3.9523	0.0106	0.0128
0.5359	0.3560	0.4817		1.3736	0.0037	0.0045
0.4666	0.4666	0.6263		1.5595	0.0042	0.0051
0.4817	0.9303	0.4817		1.8937	0.0051	0.0062
0.4817	0.8425	0.4817		1.8059	0.0049	0.0059
0.2257	0.4863	0.2257		0.9377	0.0025	0.0030
0.3597	0.1390	0.9012		1.3999	0.0038	0.0046
85.1177	66.9309	91.1524	48.8078	292.0088	0.7850	0.9513

APPENDIX G

CHAMPUS DRG REIMBURSEMENT

CHAMPUS DRG REIMBURSEMENTS

IPDS DRG	CHAMPUS WEIGHTS	IPDS DRG REIMBURSEMENT	REVISED DRG	CHAMPUS WEIGHTS	REVISED DRG REIMBURSEMENT	REIMBURSEMENT DIFFERENCE
143	0.6394	$1,625.60	139	0.6432	$1,635.27	($9.67)
88	1.3593	$3,455.87	96	1.1797	$2,999.26	$456.61
406	2.7904	$7,094.29	148	3.5614	$9,054.47	($1,960.18)
372	0.8102	$2,059.84	373	0.4666	$1,186.28	$873.56
307	1.0308	$2,620.70	311	0.7452	$1,894.59	$726.11
178	0.6263	$1,592.30	175	0.7029	$1,787.05	($194.75)
69	0.4817	$1,224.67	97	0.8014	$2,037.47	($812.80)
162	0.5421	$1,378.63	161	0.8475	$2,154.68	($776.05)
270	0.7451	$1,894.33	394	1.1131	$2,829.93	($935.60)
281	0.4130	$1,050.01	243	0.7425	$1,887.72	($837.71)
389	0.5024	$1,277.30	390	0.2257	$573.82	$703.48
270	0.7451	$1,894.33	284	0.5054	$1,284.92	$609.41
454	1.3881	$3,529.09	455	0.4340	$1,103.40	$2,425.69
133	0.9704	$2,467.14	467	0.3429	$871.79	$1,595.35
256	0.6606	$1,679.50	227	0.7236	$1,839.67	($160.17)
269	1.5437	$3,924.69	270	0.7451	$1,894.33	$2,030.36
372	0.8102	$2,059.84	373	0.4666	$1,186.28	$873.56
122	1.5068	$3,830.87	121	2.1709	$5,519.27	($1,688.40)
70	0.4016	$1,021.02	98	0.5031	$1,279.08	($258.06)
321	0.6524	$1,658.66	320	0.9528	$2,422.39	($763.73)
453	0.4458	$1,133.40	447	0.4913	$1,249.08	($115.68)
379	0.3214	$817.12	383	0.3560	$905.09	($87.97)
69	0.4817	$1,224.67	97	0.8014	$2,037.47	($812.80)
213	1.7263	$4,388.93	8	0.8608	$2,188.49	$2,200.44
320	0.9523	$2,422.39	321	0.6524	$1,658.66	$763.73
70	0.4016	$1,021.02	184	0.3297	$838.23	$182.79
223	1.1151	$2,835.02	270	0.7451	$1,894.33	$940.69
278	0.7518	$1,911.37	283	0.7153	$1,818.57	$92.80
309	1.1876	$3,091.34	311	0.7452	$1,894.59	$1,196.75
387	1.6986	$4,318.50	389	0.5024	$1,277.30	$3,041.20
387	1.6986	$4,318.50	389	0.5024	$1,277.30	$3,041.20
155	2.0912	$5,316.65	178	0.6263	$1,592.30	$3,724.35
169	0.9303	$2,365.19	168	1.8458	$4,692.74	($2,327.55)
391	0.1390	$353.39	390	0.2257	$573.82	($220.43)
454	1.3881	$3,529.09	455	0.4340	$1,103.40	$2,425.69
391	0.1390	$353.39	390	0.2257	$573.82	($220.43)
132	1.0702	$2,720.87	140	0.8099	$2,059.08	$661.79
301	0.6648	$1,690.18	73	0.6875	$1,747.89	($57.71)
47	0.5982	$1,520.86	46	0.6808	$1,730.82	($209.96)
389	0.5024	$1,277.30	385	0.8322	$2,115.78	($838.48)
182	0.7497	$1,906.03	183	0.5574	$1,417.13	$488.90
		$95,853.89			$80,087.56	$15,766.33

APPENDIX H

EFFECT OF PRINCIPAL DIAGNOSIS AND COMPLICATIONS/COMORBIDITY ON CHAMPUS DRG REIMBURSEMENT

EFFECT OF PRINCIPAL DIAGNOSIS AND CC ON DRG REIMBURSEMENT (CHAMPUS) *

IPDS DRG	CHAMPUS WEIGHTS	IPDS DRG REIMBURSEMENT	REVISED DRG	CHAMPUS WEIGHTS	REVISED DRG REIMBURSEMENT	REIMBURSEMENT DIFFERENCE
143	0.6394	$1,625.60	139	0.6432	$1,635.27	($9.67)
88	1.3593	$3,455.87	96	1.1797	$2,999.26	$456.61
*406	2.7904	$7,094.29	148	3.5614	$9,054.47	($1,960.18)
372	0.8102	$2,059.84	373	0.4666	$1,186.28	$873.56
307	1.0308	$2,620.70	311	0.7452	$1,894.59	$726.11
178	0.6263	$1,592.30	175	0.7029	$1,787.05	($194.75)
69	0.4817	$1,224.67	97	0.8014	$2,037.47	($812.80)
162	0.5421	$1,378.63	161	0.8475	$2,154.68	($776.05)
270	0.7451	$1,894.33	394	1.1131	$2,829.93	($935.60)
281	0.4130	$1,050.01	243	0.7425	$1,887.72	($837.71)
133	0.9704	$2,467.14	467	0.3429	$871.79	$1,595.35
*269	1.5437	$3,924.69	270	0.7451	$1,894.33	$2,030.36
*372	0.8102	$2,059.84	373	0.4666	$1,186.28	$873.56
*122	1.5068	$3,830.87	121	2.1709	$5,519.27	($1,688.40)
70	0.4016	$1,021.02	98	0.5031	$1,279.08	($258.06)
*321	0.6524	$1,658.66	320	0.9528	$2,422.39	($763.73)
453	0.4458	$1,133.40	447	0.4913	$1,249.08	($115.68)
379	0.3214	$817.12	383	0.3560	$905.09	($87.97)
69	0.4817	$1,224.67	97	0.8014	$2,037.47	($812.80)
213	1.7263	$4,388.93	8	0.8608	$2,188.49	$2,200.44
320	0.9523	$2,422.39	321	0.6524	$1,658.66	$763.73
70	0.4016	$1,021.02	184	0.3297	$838.23	$182.79
223	1.1151	$2,835.02	270	0.7451	$1,894.33	$940.69
278	0.7518	$1,911.37	283	0.7153	$1,818.57	$92.80
309	1.1876	$3,091.34	311	0.7452	$1,894.59	$1,196.75
*169	0.9303	$2,365.19	168	1.8458	$4,692.74	($2,327.55)
*391	0.1390	$353.39	390	0.2257	$573.82	($220.43)
*391	0.1390	$353.39	390	0.2257	$573.82	($220.43)
132	1.0702	$2,720.87	140	0.8099	$2,059.08	$661.79
301	0.6648	$1,690.18	73	0.6875	$1,747.89	($57.71)
*47	0.5982	$1,520.86	46	0.6808	$1,730.82	($209.96)
						305.06

* CC=Complications/Comorbidity